THE RHODESIA

Agricultural Journal.

Edited by the Director of Agriculture
(Assisted by the Staff of the Agricultural Department).

PUBLISHED MONTHLY.

Subscription: 5/- per annum; payable to the Accountant, Department of Agriculture, Salisbury.

VOL. XXIX.] OCTOBER, 1932. [No. 10

EDITORIAL.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regording these matters and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.

Market for Pedigree Cattle.—The breeders of pedigree cattle have had a thin time since the outbreak of foot and mouth disease, and the reappearance of cattle in the last month at the Salisbury and Bulawayo Shows has served a useful purpose in bringing pure-bred stock to the notice of the public again.

Prices for pure-bred cattle at the Salisbury Show sale were disappointing, but at both the Gwebi sale which followed next day and at the Bulawayo Show sale there was a good demand for pedigree stock. The interest shown in Africander cattle at the Bulawayo sale was a noticeable feature, and the top price for a bull (£54) was paid for one of this breed from the Matopo Estate.

Legislation in the Union foreshadows the compulsory use of improved bulls in certain areas, and if the cattle improvement provisions in the published draft legislation are

enacted, there is likely to be a shortage of pure-bred bulls in the south, which would react greatly in favour of those breeders of pure-bred stock in Rhodesia who have had the courage to "stick to their guns."

In point of fact, there is a great shortage of pure-bred bulls in the Colony. It has been estimated that it would require 3,000 bulls per annum for ten years to improve effectively the quality of the European-owned cattle in the Colony. The present output is possibly 700-800 head, and once regular export trade in cattle and cattle products is developed, the breeder of pedigree stock will be one of the first to benefit.

Insect Transmission of Virus Diseases.—In the last issue of this Journal mention was again made of experiments conducted to demonstrate the possibility of white fly transmitting leaf curl of tobacco. Since that date an interesting article has been received on further studies on plant virus diseases which indicates that, in the case of at least certain kinds of insects which are thus concerned, their ability to transmit virus diseases depends upon the stage of their development at the time when they feed upon infected plants. Kenneth M. Smith reports, in the "Annals of Applied Biology," August, 1932, that when non-infected adults of thrips are colonised upon various plants affected with spotted wilt virus and then transferred to healthy plants the disease is not transmitted. It had previously been shown, however, that when the same species of thrips was applied to virus-infected plants in the larval stage they could, when feeding on healthy plants in the adult stage, then transmit the disease. This interesting phenomenon is exactly the reverse of what happens in the case of the leaf hopper which transmits the virus disease of asters known as Aster Yellows. In this case the adult can transmit the disease, but not the larva. It is possible that the experiments which will be continued next season with leaf curl in tobacco will demonstrate that the stage upon which white fly feeds on infected tobacco has an important bearing on its ability to transmit the disease.

Quality in Wheat.—Although the quantity of wheat produced in this Colony has during recent years only averaged about 20 per cent. of our local requirements, there are definite indications that wheat growing, particularly on wet vleis, is steadily increasing. To meet the millers' requirements for a standard flour of good strength, it has been supposed that it was always necessary to mix a certain proportion of Australian and Canadian wheats with the local produce to secure the desired quality. In order to enable a sufficiently high price to be paid for locally grown wheat, and thus to give encouragement to the industry, the Government has for some years past allowed a rebate of the duty, amounting to about two shillings a bag, on every four bags of imported wheat milled with one bag of locally grown wheat. For a year or two this allowed the millers to pay as much as 27s. 6d. a bag for local wheat, but with the fall in world prices the price fell last year to 23s.

The possibility of continuing any such arrangement is at present under discussion, and the result will be awaited with great interest by all growers. It is highly probable that the price of 23s. per bag will be retained for the coming year for wheat which is not less than 62½ lbs. per bushel. The price is influenced largely by quality, and a number of enquiries have recently been received on this subject which indicate that what is meant by quality in wheat is not generally understood. The same questions are apparently being asked by growers in many parts of the world, and in this issue an article is reprinted from the August number of the *Agricultural Gazette* of New South Wales, which deals with the question in a very interesting manner.

Soya Bean Cultivation.—The British Empire continues to furnish upwards of half the world's requirements in oil-seeds and oils, but Soya beans, olives, hemp seed and sunflower seeds are grown on but an insignificant scale within the Imperial territories. So far as Great Britain is concerned, the imports of olive oil are only small, and hemp seed and sunflower seed are not among the oil-seeds usually crushed in British seed-crushing mills. Soya beans, there-

fore, constitute the only item of considerable importance to the home trade, of which supplies have to be sought from countries outside the Empire. In view of the commercial success which has followed the acclimatisation of the Soya bean in the United States, it is therefore a matter for regret that more has not been achieved with this crop in British territory. The Soya bean ranks second in importance among the world's oil-seeds, and has the additional advantage of being a rotation crop, and it is hoped that more may be done to develop it in the Sudan, South Africa and Australia. It has already been proved as a result of extensive experimental crops that the bean can be grown with success in Northern India and over a large part of South Africa. Experiments in Victoria and Queensland have also been entirely successful. The large scale production of the Soya bean in any of these territories would be a great boon.—*Chemical Age*, July, 1932.

Grain Crops.—"Grain Crops" is the title of the latest publication of the Empire Marketing Board. It is the second of a new series in which the Board is dealing crop by crop with the principal foods of the world and the Empire's share in growing and selling them.

"Grain Crops" deals with wheat, wheat flour, barley, oats, maize, rice and rye. It explains that most of the grain in the world is consumed in the country which grows it, and the proportion of world crops which enters the international market is not large. Only about 16 per cent. of the world's wheat is shipped either as grain or as flour, and the proportions for other grains are even smaller.

The Empire considered as a unit exports more wheat than it imports, contributing nearly three million tons annually to the world markets. Before the war the Empire was on balance an importer of wheat.

Of the other major crop, rice, the Empire is also an exporter to the extent of some 680,000 tons. In other grains the Empire has no such considerable export, and, in fact, is an importer, though not to a large extent, of oats and barley, and imports maize to the extent of two million tons —a third of the crop required.

Prices and their falls in the last three years are illustrated in tabular form.

This book gives in hand compass the relevant figures crop by crop for each of the grains discussed, but it is not a mere compilation of statistics, and the meaning of the figures is explained. It is published by H.M. Stationery Office, and costs 6d.

The World's Dairy Produce.—A number of striking comparisons, showing the importance of dairy produce to the different countries of the world, are given in a new Empire Marketing Board pamphlet "Dairy Produce—A Summary of Figures of Production and Trade" (H.M. Stationery Office, price 6d. nett). It is stated that, taking the world as a whole, milk is a more important contributor than any other single product to the farmer's income, and that eggs probably rank before wheat and rice and immediately after milk.

More milk is used for drinking or cooking than is made into butter, and more is made into butter than into cheese or any other product. Empire countries take second and third places on the list of both butter and cheese exporting countries, but make only a poor showing in the export trade in eggs and preserved milk. In most countries eggs are mainly produced for home consumption, and it is pointed out that only Denmark, among all the exporting countries of the world, exports as much as half its total production of eggs.

Tables are given showing the part played by butter, cheese and eggs in the external trade of the chief exporting countries. Butter represents nearly a third of Denmark's exports, and over a fifth of those of New Zealand. Cheese forms about 13 per cent. of New Zealand's exports. Exports of eggs and egg products take third place in the list of China's exports.

Huge Dairy Imports in Britain.—The United Kingdom is easily the world's largest importer of each of the five products—butter, cheese, preserved milk, eggs and egg

products—dealt with in the pamphlet, and the magnitude of this country's imports from foreign sources makes the Empire, taken as a unit, a nett importer on a considerable scale of each of the five products. The balance of the Empire's import trade amounts to between three and four million cwts. of butter, from 300,000 to 500,000 cwts. of cheese, about three million cwts. of preserved milk, nearly 2,500 million eggs, and approaching a million cwts. of liquid eggs.

This pamphlet is the first of a series which will deal in turn with all the major agricultural products. Grain crops and meat are to be the next group of products in the series.

The World's Meat.—*Division of U.K. Market.*—The unique size and importance of the United Kingdom as a market for meat products, and the small share of the total imports at present enjoyed by the Empire countries, are brought out in the Empire Marketing Board's "Survey of Meat," the latest number in the Board's new statistical series (price 6d.). It gives the figures of world production as far as they can be ascertained, and distribution of exports and imports of all the principal countries, dealing in turn with beef, mutton and lamb, bacon and hams, pork, cattle, sheep, pigs, and canned meat. A particularly useful part of each section is that analysing the position of the Empire considered as a unit importing or exporting from the rest of the world.

The Empire as a Home for Pigs.—The Empire emerges from the enquiry with more than a third of the world's sheep and 40 per cent. of its cattle, but with no more than 4 per cent. of its pigs. Of the 280 million pigs in the world, only 12 per cent. are Empire pigs. The Empire has, however, more than a third of all the goats.

The import of meat into the United Kingdom from the United States, Argentina and Denmark in particular is a large item in our foreign trade. The Empire imports a great deal of chilled beef—400,000 to 500,000 tons annually—and gains of chilled beef at the expense of frozen beef have diminished the share of the Dominions in the United Kingdom

market. Mutton is also imported on a large scale—over 2,000,000 cwts. annually — the United Kingdom being far the most important market in the world for exporters. Foreign imports of lamb have increased and are now 32 per cent. of the total, where they were 23 per cent. in 1926. The New Zealand imports have also increased and are more than half of the total.

Bacon.—The United Kingdom is a heavy importer of bacon, and imports from outside the Empire have been increasing of recent years, averaging well over 400,000 tons annually. Ninety per cent. of the imports of bacon and ham were of foreign origin, about 70 per cent. of the bacon from Denmark and 80 per cent. of the hams from the United States.

Canned Meat.—The United Kingdom is also a very large importer of canned meat, over a million cwts. coming annually—70 per cent. from Argentine and Uruguay and some 8 per cent. from the United States. The Empire countries only send some 4 per cent. of the total imports of canned meat into Great Britain.

Home Production.—The home farmer produces about half of the beef supplies. In the ten years previous to 1928 imports were increasing, but the share of the home producer began to rise, and rose till 1930. The home farmer produces about 43 per cent. of the mutton and lamb. Five million cwts. of pork are produced locally, of which about one-half probably goes for curing. The import figure is more than double this.

PIGGERIES.

(Concluded.)

By B. G. Gundry, A.I.Mech.E.

Before passing on to the colony system of pig keeping, there are two modifications to the building already described which are well worthy of attention.

The first is the introduction of wooden floors in the breeding pens, such floors add considerably to the comfort and health of the sow and young pigs, particularly in cold localities. It also minimises losses at farrowing due to the young pigs getting entangled in deep bedding and being overlain by the sow. As it is essential that the floors should be removable for cleaning purposes, they have to be made in four sections, each section is 2 feet 6 inches wide by 9 feet 6 inches long. If the opening to the pen in made 2 feet 9 inches wide, each section can be slid in under the farrow guard as illustrated on plate 2. It will be noted that where wooden floors are to be installed, the farrow guard must be supported by brackets built into the wall instead of in the floor, and they must also be set 12 inches instead of 9 inches above the concrete floor, so that they are the correct height above the wooden floor when in position.

Lengths of old tyre iron about 4 inches wide and 30 inches long, drilled for a half-inch diameter bolt, 1½ inches from each end will make satisfactory supports. These should be cast in concrete blocks 12 inches long by 9 inches wide by 6½ inches thick, which are built into the wall so that the iron projects by an equal amount on either side of the division walls, and will support the guards in the adjacent pens. The support in the wall between the pen and the yard will need to be only 18½ inches long, as it has to project on the inside only.

The floors themselves are made from ordinary 6 inch flooring supported on four 3 x 2 inch battens to which they are nailed with 4 inch nails, clinched or bent over on the under side.

The second item is a labour-saving device in the form of a special trough set in the front wall of the yard over which hangs a swinging door or shutter. By this arrangement the trough may be filled from the feeding passage without entering the yard, and the pigs are prevented from getting into the trough while the food is being poured in and thus saving waste. At the specified feeding times the doors are swung to the open position to permit the pigs to feed. In some instances where this type of trough is fitted, the gate into the yard is entirely dispensed with, the door of the trough being fully opened to give ingress and exit for the pigs while humans merely stride over the top. This arrangement, although perhaps a little crude, permits one to instal the improved type of trough at very little greater expense.

The illustration on plate 2 shows the method of construction; the pipe from which the door is hung must, of course, be securely fixed at the ends, and this is best done by setting it in concrete blocks, although there are many alternative ways of hanging this door. One cheap method particularly adaptable when the ordinary gates are dispensed with, is to lay a stout piece of timber such as a gum pole 4 or 5 inches in diameter on the top of the wall to which it must be secured with hoop iron straps, and hinge the door with rings to eye bolts passing through this timber. A more permanent method is to cast a reinforced concrete lintel over the opening and set the eye bolts into that.

The door is kept open or closed by means of two 12 inch tower bolts which engage with lengths of small diameter iron pipe set in the front and back edges of the concrete trough.

Colony Houses.—In countries where building timber is relatively cheap, pigs are frequently housed in wooden sheds built on runners so that they can be hauled from camp to camp, but such buildings would be too costly in this Colony, and as an alternative it is recommended that a type

of temporary house such as that illustrated on plate 2 should be used.

Such a house consists of four upright poles carrying a roof of corrugated iron covered with thatch, or of thatch alone. The sides may be of single sheets of corrugated iron or of pig-netting or wooden rails covered with thatching grass, tied on with "tambo" or baling wire.

If the roof is made as a separate unit and bolted to the uprights, it can be readily transported to a new set of uprights on a new site each season, or if the butts of the uprights are tarred they can be dug up and transferred from one site to another, and such houses in which iron is used may be regarded, at least, as semi-portable; those of thatch only would be better burnt when finished with.

Automatic Feeder.—Various types of automatic feeding hoppers are popular among pig farmers in America where they are strongly advocated by the various agricultural authorities.

Many advantages are claimed for this method of feeding. In the first place it saves labour, as several days' supply of food can be placed in the hopper of a feeder and is available as and when required. An economy in food is effected, as it cannot be easily scattered. The pigs being "food wise" select the food they require and to a large extent balance their rations, with the result that the pigs put on weight quicker than when fed by hand for a smaller consumption of food per pound of increase in weight.

This method of feeding is particularly advantageous for young pigs and porkers which require food in small quantities at frequent intervals; it is, however, likely to be over-fattening for baconers. There is no danger of pigs over-eating themselves.

There are many designs of these feeders, and one of the simpler type is illustrated on plate 2. As will be seen, it consists of a hopper 5 feet long and 2 feet wide, divided into two compartments 1 foot and 4 feet long respectively; the former is for meat and blood meal, etc., and the latter for maize or other grain.

The flow of feed from the bottom of the hoppers into the troughs on either side is controlled by adjustable hinged

flaps by which the opening through which the food escapes may be varied in width to suit the particular type of food.

As will he seen in the drawing, the flaps themselves, which are 9 inches wide and run the full length of the compartments, are hung by 4 inch strap hinges to 6 inch boards, the position of which is adjustable by means of round headed bolts fitted with washers and wing nuts passing through vertical slots in the lowest fixed boards in the sides of the hopper. The position and length of the slots should be such that the opening between the bottom of the flaps and the trough through which the food passes, may be entirely closed or opened to a width of 2 inches.

The correct adjustment of the openings is all-important if the full benefit of this type of feeder is to be obtained. The flaps should be set so that the action of the pigs nosing at the opening and pushing against the flaps will cause the food to trickle through at the proper speed. The pigs should have to work for their feed, but must not be discouraged by too great a difficulty in obtaining it. The object of having the flaps hinged is to permit them to move inwards and thus agitate the food and prevent it sticking in the opening.

Hay Rack.—A hay rack constructed of native timber as is shown in plate 2 is useful, where breeding pigs are kept in paddocks or pens, for feeding lucerne and other palatable leguminous hay. By the use of such racks the hay is kept dry and clean and the pigs are encouraged to eat such hay, with, as a rule, beneficial results on the size of the litters. The main frame work is best bolted together with three-eighth inch diameter bolts, and the thinner sticks forming the sides can be either nailed in place or bound on with fencing wire.

Troughs.—Two types of portable troughs are illustrated. The first is of concrete and may be constructed in the following manner:—A log of wood about 6 feet long and 12 inches in diameter, as straight and circular as possible, is embedded in a piece of level ground up to its longitudinal axis. The ends are bevelled off to a good slope so that it will eventually draw away from the concrete cast round it without difficulty. Two strips of board 2 inches wide and 1 inch thick are now laid on the ground on either side of the log

and are trimmed up where necessary so that the inner edges fit neatly against the log along its whole length. The strips should extend 3 inches beyond each end of the log, and the spaces between the projecting ends are filled in with other pieces of hoard. Two lengths of 9 inch by 1½ inch plank, planed smooth on the inner side, the same length as the strips, are now placed upright on either side and are held in position by three pegs about 2 inches square, driven well into the ground. If the soil is not sufficiently hard to hold them rigid, strips of wood (not shown in the drawing) may be nailed across each pair of pegs to tie them together and prevent them being forced apart when the concrete is rammed into the mould. In any case these ties would be an advantage, as it is desirable that the mould should be as rigid as possible. Two end pieces of 9 inch by 1½ inch plank are now screwed to the end uprights, to which the side planks should also have been nailed or screwed and the mould is complete.

Any cracks in the log or planks and any crevices between them should be filled in with clay or wax, and the whole interior surface with which the concrete will come in contact should be rubbed over with thick oil or grease to prevent the concrete sticking, but it must not be left as a thick layer which will mix with, and spoil the concrete.

Actually, all that is now necessary is to fill the mould with concrete, but the writer would suggest that before doing so the inside of the mould should be roughly plastered over with a thin layer of 1:2 cement plaster in order to give the inside of the finished trough a hard smooth surface.

This must be done as the concrete is being mixed, as the plaster must not he allowed to commence to set before the concrete is added. The whole operation of plastering and filling should be completed within half an hour from the time water is first added to the plaster and concrete. The concrete should be mixed in the proportion of one part cement, two-and-a-half parts sand and four parts stone, which must be crushed to pass a ¾ inch ring. About half a bag of cement will be required for the job.

When filled, the mould must be covered with wet sacks and kept continuously damp for at least 72 hours before any attempt is made to remove the trough from the mould.

After removal the trough must be immediately re-covered and kept damp continuously for a further four or five days—longer if possible.

A mould of this description can, with reasonable care, be used over and over again, but the timber should not be left exposed to the sun as it will warp and twist; in fact it is a great advantage to carry out any concrete work of this nature in an entirely shaded spot.

A light wooden trough can be fairly easily constructed from 9 inch by 1½ inch planks. Two end pieces are cut to the shape shown in the illustration, which are designed to prevent the trough being readily overturned. The sides of the trough are let into the end pieces to a depth of half an inch. This can be done by making two pairs of saw cuts 1⅜ inches apart and half an inch deep, roughly at right angles to each other and cutting out the intervening timber with a chisel, thus forming two grooves into which the ends of the side planks are fitted. Three screws 4 inches long can then be driven in through the end piece into each side piece. If a strip of stout hoop iron is nailed right round the edge of each end piece and other strips are used to tie the sides to the end pieces, the durability of the trough will be considerably increased.

Such a trough can be made to any convenient length up to 6 or 7 feet. A plank 16 feet long, costing about 8s., will make a 6 foot trough.

Pig Creep.—This is merely a grating made of straight veld poles nailed or screwed together, which can be placed across the corner of a pen, and behind which small troughs may be placed to which the young pigs will have access but from which the sow will be excluded. This is a big advantage in forcing the growth of the young pigs, and when necessary special rations can be fed to them only. The creep can be held in position by screw hooks engaging with eyes screwed into wooden plugs driven into the walls of the pen.

Rubbing Post, or Self Oiler.—The oiling of pigs as a remedy for lice is a messy operation which can, to a large extent, be avoided by the use of this device. It consists of a wooden post driven securely into the ground and round

which an old sack is tied. The sack is kept saturated with oil (practically any variety, such as old sump oil, will do). By rubbing themselves against it the pigs keep themselves oiled, but frequent applications of oil to the sack are necessary to render it fully effective when lice are troublesome.

Shipping Crate.—Figure 3 shows a shipping crate designed to meet the requirements of a farmer who was sending pigs to market by the railway road motor service. The journey occupied two days, and it was necessary to provide means by which the animals could be fed and watered *en route* without allowing them out of the crate. For shorter journeys the feeding arrangement is unnecessary. This particular crate was designed to carry two animals weighing 180 lbs. each, but the following table of sizes published by the University of Missouri may be found useful in arriving at the dimensions of crates for individual requirements:—

Weight of hog (lbs.)	Length of crate (inches)	Width of crate (inches)	Height of crate (inches)
25 to 75	35	12	23
75 to 150	46	18	28
150 to 250	54	20	34
250 to 350	60	20	38
350 to 500	64	24	40
500 to 800	80	30	48
800 to 1,000	84	30	50

It is suggested that a crate to carry two animals should be made somewhat wider and shorter than the dimensions given for a single animal of equivalent weight.

Unless some suitable timber is available, such as a motor car packing case, ordinary 4 inch and 6 inch flooring can be used, the tongues and grooves being first removed, as the former will splinter and the latter collect dirt and vermin. The gate and sliding rail which gives access to the feed and water tins are each kept closed by ordinary tower bolts, or special locking bolts which can be secured with a padlock may be used if desired. The whole crate should be assembled with wood screws, as nails will soon work loose. The cost of materials for the crate illustrated would be approximately 30s.

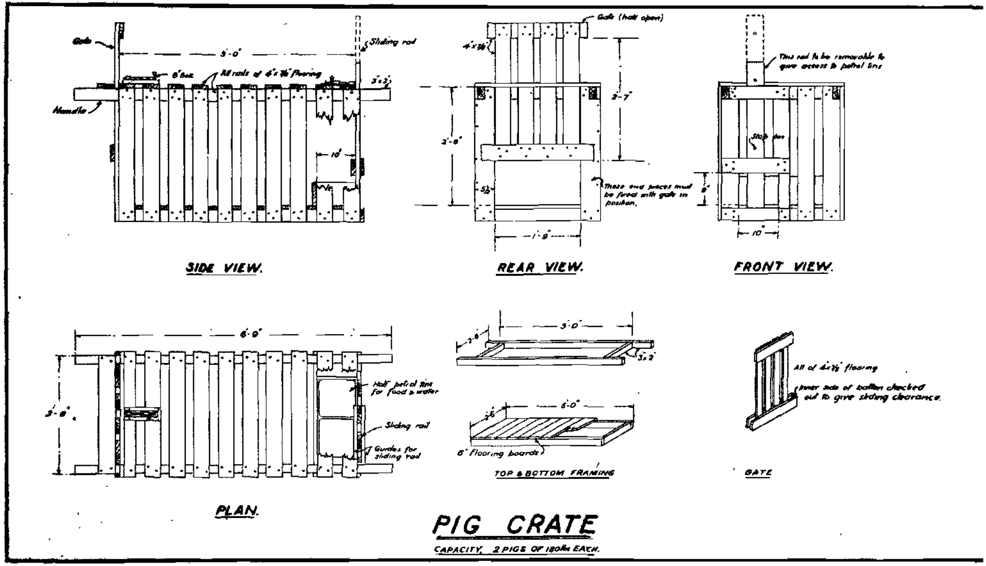

Gate
Sliding rod
5'-0"
6" Box
All rails of 4" x ⅞" flooring
3" x 2"
Handle
10"
SIDE VIEW.
Gate (half open)
4" x ⅞"
2'-7"
2'-6"
5½"
These end pieces must be fixed with gate in position.
1'-9"
REAR VIEW.
This rod to be removable to give access to petrol tins
Stop pin
8"
10"
FRONT VIEW.
6'-9"
2'-8"
Half petrol tins for food & water
Sliding rail
Guides for sliding rod
PLAN.
5'-0"
2'-6"
3" x 2"
6'-0"
6" flooring boards
TOP & BOTTOM FRAMING
All of 4" x ⅞" flooring
Inner side of batten checked out to give sliding clearance.
GATE
PIG CRATE
CAPACITY, 2 PIGS OF 180lb EACH.

Figure 3.

Concrete and Cement Work.—As cement figures rather largely in the building of a permanent piggery, some of the more important points to be observed in its use for making concrete and cement plaster are given here, but for more detailed instructions the reader is referred to an article entitled "Concrete on the Farm," by N. P. Sellick, which was published in this Journal in April, 1926, and which is available as Bulletin No. 588.

Cement deteriorates rapidly in storage, and only fresh stocks should be used for permanent work. All sand used for concrete or cement plaster should be clean, sharp river sand which should not contain a large proportion of dust or fine particles. Sand containing dust or clay can be made useable by washing, but for any but small quantities this is rather a laborious business. Any hard, clean stone, such as granite quartz diorite or quartzite may be used as an aggregate, but friable or oxidised stone is useless. The stone should be crushed so that no pieces are larger than that required for the particular job.

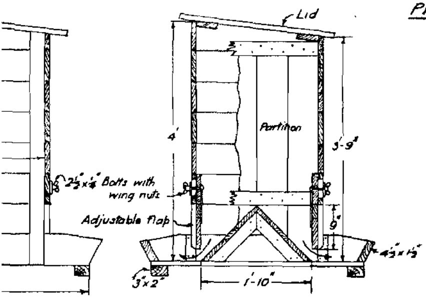
The water used for mixing cement should be clean and reasonably free from dissolved impurities.

The ingredients of concrete or cement mortar should be accurately measured to give the proportion required, by the use of paraffin tins, or for large quantities, proper measuring boxes. These consist of four sides, but have no top or bottom, and should be so proportioned that they contain some even number of cubic feet.

As the inclusion of earth or clay seriously affects the strength of cement mixtures, the mixing must not be done on the bare ground, but on a proper platform of wood or iron or on an existing cement floor.

The cement and sand should be thoroughly mixed, first while quite dry, after which the stone, which may with advantage have been previously wetted, is added. The whole should again be thoroughly mixed, being turned completely over at least twice before the water is added, which is best done by means of a watering can fitted with a rose.

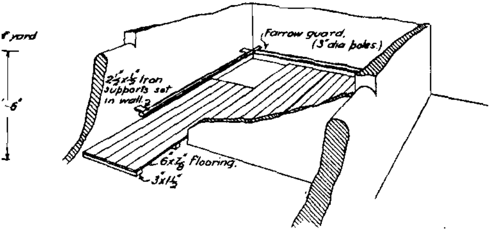
Plate 2



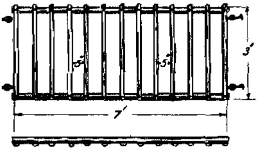
V

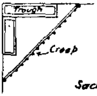
Section

ER.



WOOD FLOOR FOR PERMANENT HOUSE.





PIG CREEP

RUBBING POST.

Irrigation Division

As soon as the water is added the concrete or mortar must be mixed thoroughly and as quickly as possible. Only sufficient water should be added to reduce the mass to a workable consistency, as any excess of water tends to wash away the cement and also reduces the ultimate strength of the concrete. It will be found that in the final stages of the operation the mixing alone will reduce the mass to a *more liquid consistency without the addition of more water.*

All cement mixtures, whether concrete, mortar or plaster, should be placed and finished off within 30 minutes from the time the water is first added.

Cement work, after being finished, must be "cured" by being kept damp for as long as possible; a concrete floor should be covered over with wet sacks or clean grass and kept continually wet for at least seven days; if circumstances permit this period may be doubled or trebled with advantage.

In the case of concrete plastered walls of a piggery, the same course should be adopted as far as possible, although it is not so easily done, but even if continued for a day or two, the ultimate hardness of the plaster will be very considerably increased.

Quantities.—For estimating purposes, a list of the more important materials required for the construction of a unit of six complete pens and yards only, similar to those shown in plate 1, and their approximate cost is given herewith:—

Quantities for Six Pens and Yards.

Item.	Quantity.	Approximate Cost f.o.r. *Salisbury*.
Bricks	18,500	—
Lime	19 bags	£4 8 8
Damp course, 26 g. gal. iron	15 sheets	2 12 6
Alternative damp course, 3-ply felt	25 yards	2 0 0
Cement for concrete floors ...	45 bags	26 0 0
Alternative cement for grouting masonry floors	6 bags	3 9 0
Cement for plastering walls ...	20 bags	11 10 0
Timber for roofing, 6in. x 2in. x 16ft.	6 lengths	4 5 0 (for both timber items)
Timber for roofing, 6in. x 2in. x 18ft.	6 lengths	
Roof iron, 24 gauge, 12ft. long	36 sheets	12 5 0
Roofing screws and washers	2½ gross	0 8 3
Timber for gates, 6in. x ⅞in. x 14ft. flooring	9 lengths	1 5 0
Timber for gate posts 3in. x 1½in. x 14ft.	3 lengths	0 7 0
Tee hinges, 18in.	12	1 7 0
Bolts for securing gate posts, 24in. x ½in.	6	0 9 0
Bolts for securing gate posts, 9in. x ½in.	12	0 3 0

A PARASITE ON COWPEAS.

(*ALECTRA VOGELII* BENTH.)

By J. M. Rattray, M.Sc., Botanist.

Introduction.—The root parasite *Alectra Vogelii* Benth, has just recently caused a certain amount of damage to cowpea crops in Southern Rhodesia, and unless due precautions are taken there is a likelihood of the pest increasing and causing considerably more trouble.

Growers of cowpeas, French beans or groundnuts would be well advised periodically to inspect their crops thoroughly to ascertain whether this pest is present, and to eradicate immediately any plants which appear to be similar to the one here described.

This plant, which belongs to the same family as the ordinary garden snap-dragon and the common parasite on maize, witch-weed, is parasitic on the roots of cowpeas. As far as our own observations go, it appears to confine itself to this particular leguminous crop as a host, but in the Union of South Africa it has been found on French beans (*Phaseolus vulgaris*) and monkey nuts (*Arachis hypogea*) as well.

The original specimen of the parasite which was sent in for identification was named *Melasma orobanchoides*, but there still appears to be a certain amount of controversy among botanists with regard to the two genera *Alectra* and *Melasma* and the parasitic habits of each. Several species of *Alectra* were formerly included under *Melasma*, but more recent authorities consider that all the parasitic forms should be included under *Alectra*. *Alectra Vogelii* Benth is the commonest parasitic species found in this country.

Description.—In appearance the plant is an erect, hairy herb, 9 to 19 inches high, sometimes branched at the base. The branches are straight and bear flowers and leaves almost

from the base upwards. The leaves are small, about an inch long and half an inch wide, and have three main veins which can plainly be seen when the leaf is held to the light. The flowers are yellow in colour and about half an inch in diameter, and grow out on short stalks of not more than a quarter of an inch in length, from the junction of the leaves and the main stem.

The base of the stem, just below the surface of the soil, is a hright orange-yellow colour when freshly pulled out, *and where the underground portion of the parasite comes in* contact with the cowpea roots, it is swollen and matted with fine roots. Characters which make the plant easily recognisable are:—

1. The three main veins in the leaf.
2. The yellow colour of the flowers.
3. The bright orange colour of the base of the stem when first pulled out of the ground.
4. The swollen underground portion which is in contact with the host-root.

Control.—Owing to the very free seeding habit of this plant and the extraordinary length of time for which the seeds remain viable, and lie dormant in the soil, it would appear to be a most difficult pest to eradicate. It is an established fact that even after allowing six years to elapse before planting cowpeas again on infected land, the legume was attacked by the parasite.

Probably the surest way of controlling the pest, therefore, would be to prevent it from seeding by hoeing out every plant while it is still in flower. If cowpeas are again sown on the land it is more than likely that the parasite will appear again, but continued hoeing ought eventually to eliminate it, as all old seed which had been lying dormant in the soil will have germinated, and no fresh seed will have been allowed to fall.

Another method of control which might successfully be employed is that of planting a catch crop of cowpeas and ploughing it in for green manure before the parasite sets seed. Here, of course, it would be absolutely necessary to do the ploughing before any seed had been formed by the Alectra plant.

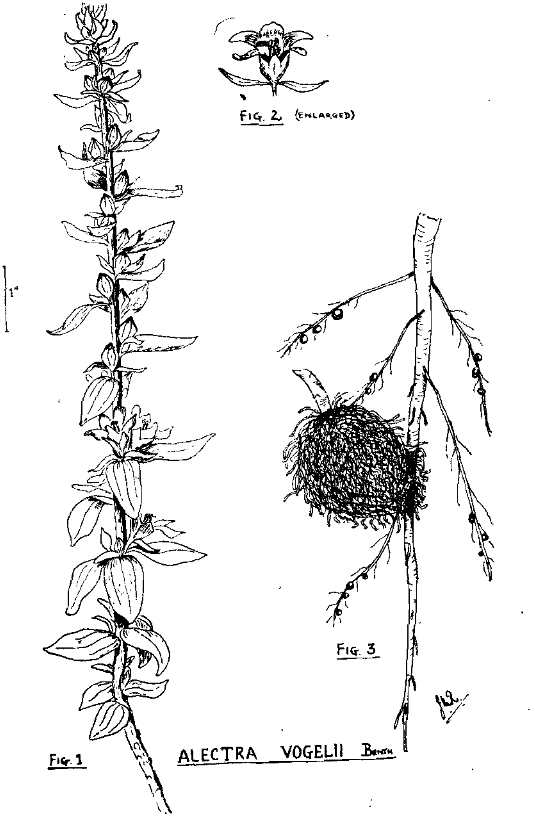


Fig. 1.—Above-ground portion of *Alectra Vogelii*, showing flowers and leaves.

Fig. 2.—Flower of *Alectra Vogelii*.

Fig. 3.—Underground portion of *Alectra Vogelii*, showing the swollen root attached to a cowpea root.

Conclusion.—The source of this pest is obscure at the moment. The cowpea (*Vigna sinensis* = *V. catjang*) is described as being a widely spread plant, especially in the tropics, so that if it occurs in the wild state in Africa, the supposition is that it is probably attacked by *Alectra Vogelii* in its natural surroundings. Again, since it has been found that the French bean and the groundnut have been attacked by the parasite, it is quite possible there are other legumes which may be hosts.

The parasite may therefore have been introduced into cultivated lands through there being other native leguminous hosts, or through it being parasitic on the wild form of cowpea. Unfortunately it has not yet been reported on any native legume either in Rhodesia or the Union, so that the above theories as to its source are still merely theories.

Once the parasite has made an appearance on cultivated crops, it can very easily be disseminated throughout the country owing to its free-seeding habit. Farming implements are likely agents of transportation, and could carry the seeds from one land to another, where they would remain dormant in the soil awaiting favourable opportunities for germination.

If farmers would report, therefore, the occurrence of any plants resembling this parasite which appear to be attacking either wild or cultivated leguminous plants, much might be done to arrive at a definite means for its control and eradication.

AGRICULTURAL EXPERIMENT STATION, SALISBURY.

ANNUAL REPORT, 1930-31 (Concluded).

By H. C. Arnold, Station Manager.

Published with the authority of the Chief, Division of Plant Industry.

LIMING EXPERIMENTS.

First Series.—These trials were commenced six years ago, when in 1925-26 duplicate plots of land were dressed with half ton and one ton of lime respectively. Two controls which received no lime were included. The plots have been cross-planted in strips each year to maize, cotton, ground nuts, sunflowers and haricot beans. Owing to the lack of uniformity in the inherent fertility of these plots which became apparent in 1926-27, it was deemed advisable to divide them, and having ascertained the crop-producing power of each of the halves, to make further applications of lime before continuing the trials the following season. Hence on one half of the plots, which had previously been treated at the rate of one ton of lime per acre, a further dressing was given; on one half of each of the original half-ton plots an additional half-ton was applied, and on one half of each of the plots which had not previously been limed, a dressing of three tons per acre was applied.

In the series, therefore, we have had duplicate plots which have received lime at the following rates in tons per acre: 0; ½; ½ plus ½; 1; 1 plus 1; 3. In the tabulation below are shown the average yields of duplicate plots for the season before the second applications were made, as

well as those for the subsequent seasons. The columns are arranged in the same order as the plots occur in the field.

Yields of Maize in Bags per Acre.

Treatment, August, 1925.	One ton of lime.		Half ton of lime.		No lime.	
Yields, 1926-27	17.10	17.40	19.95	18.75	13.20	13.05
Second treatment August, 1927, on one half of each of the original plots ..		one ton lime		half ton lime		three tons lime
Yields, 1927-28	16.65	17.40	18.00	17.25	16.60	17.55
Yields, 1928-29 . ..	12.45	12.56	15.37	14.92	11.29	14.47
Yields, 1929-30	12.32	13.78	13.33	12.96	11.68	14.51
Yields, 1930-31	14.55	14.70	14.10	13.95	12.15	14.63
Totals 4 seasons	55.97	58.44	60.80	59.08	47.72	61.16
Difference due to second treatment	2.47		1.72		13.44	
Average annual difference	.62		.43		3.36	

Examination of the yields during the season 1926-27 shown in the central pair of columns shows that the soil to which the second application of a half-ton of lime was made was less fertile than that of the plots which received no additional lime, the difference in yield being 1.20 bags per acre. The application of half a ton of lime appears to have increased the yield of the treated plots so that after the dressing was applied the four-year average was only half a bag less than that of the treated plots, which indicates that this small dressing of lime increased the yield of those plots by approximately .77 bags per acre per annum. From the returns shown in the left hand pair of columns, it is seen that although the yields of the two halves of the plot which received the one ton dressing in 1925 were about equal in the season 1926-27, those on the half which received an additional ton of lime were increased by .62 bags per acre per annum. There is also a marked difference in favour of liming where the heavy dressing of three tons was applied to land which had not previously been treated.

Second Series of Liming Experiments.—In 1928 two strips of land which were carrying maize were each divided lengthwise, and each of the four strips thus obtained were divided crosswise into six sub-plots, and the yield of

each of the twenty-four sub-plots was recorded. Later, the two central strips of sub-plots were dressed with agricultural lime at the rate of one ton per acre, and the two adjoining strips were left untreated. The land was then ploughed in the usual way. In this experiment, therefore, each of the sub-plots which has received lime has a neighbouring sub-plot which has not been treated, and each pair of sub-plots has received exactly the same treatment in all other respects over a period of several years.

The table below shows the four groups of sub-plots and the yield of each during the season 1927-28 (before the trials began), and in the next column are shown the combined yields of the two seasons 1928-30 (following the application of lime to two groups). The whole area received farm manure in 1926-27 at the rate of 6 tons per acre.

Yields of Maize in Bags per Acre.

	1927-8. Before trials began.	1929-31. No lime.	1927-28. Before trials began.	1929-31. One ton lime per acre.	1927-28. Before trials began.	1929-31. One ton lime per acre.	1927-28. Before trials began.	1929-31. No lime.
	18.48	29.58	17.64	31.98	15.24	28.65	16.68	25.98
	20.52	23.55	19.20	24.87	13.32	21.93	12.48	17.64
	20.64	32.88	19.68	37.32	14.28	27.72	14.16	21.18
	19.56	27.66	18.24	33.84	15.36	26.22	16.08	20.68
	20.16	18.54	18.84	26.82	13.32	31.56	14.04	31.80
	18.24	22.26	19.32	33.30	16.44	32.28	18.00	28.44
Totals	117.60	154.47	112.92	188.13	87.96	168.36	91.44	145,72
Averages . .	19.60	25.75	18.82	31.36	14.66	28.06	15.24	24,29
Difference between average yield 1927-28 and 1929-31	plus 6.15		plus 12.54		plus 13.40		plus 9.05	

By comparing the yields quoted in the left of each pair of columns, the degree of fertility of the various sub-plots before this experiment began can be gauged. They indicate that the average fertility of the sub-plots which were subsequently limed was at that time slightly lower than those which received no treatment. Since the application of lime, however, the sub-plots which received the dressing have, in every case, given heavier yields than

their counterparts which were not treated. These results indicate an average increased yield of 5.37 bags per acre during the three-year period 1929-31 as a result of applying one ton of lime per acre.

In the third series of trials, on a block of sixteen plots arranged after the manner of squares on a chess-board, alternate plots were dressed with lime, four receiving half a ton, and another four one ton of lime per acre. In the season 1928-29 maize was grown, in 1929-30 hay crops, and during the season under review, after dressing the whole with 200 lbs. per acre of phosphatic fertiliser, maize was again sown on this area. The tabulation below shows the average yields of the plots under different treatments, before and after the application of lime in August, 1928.

Maize Yields in Bags and Hay in Tons per Acre.

Maize, 1927-28 (before liming).	Treatment, August, 1928.	Maize, 1928-29, average of all plots.	Legume hay, 1929-30.	Maize, 1930-31, average of all plots.
8.48	1 ton lime (4 plots)	8.37	3.01	12.84
8.56	½ ton lime (4 plots)	7.70	2.54	11.76
8.27	No lime (8 plots)	6.77	2.49	10.8

All three series of experiments recorded above point to the fact that applications of lime to soils of the type met with on this station are of material benefit in increasing crop production, but it still remains a moot point as to whether a similar expenditure on artificial fertilisers or fertilisers combined with green manuring might not afford an even more favourable financial return. Enquiry into this aspect of the case is in progress.

The Effect of Nitrate of Soda on the Yield of Maize.—It is well known that in common with other grain crops, maize requires large amounts of nitrogen for its development, and the object of these experiments was to determine whether applications of nitrate of soda could be beneficially employed in the production of this grain crop.

In the season 1929-30, after a basal dressing of 400 lbs. per acre of potassic superphosphate had been given over the whole area, nitrate of soda was applied in three different ways, namely:—

(a) 75 lbs. per acre in the drills when the seed was sown.

(b) 150 lbs. per acre in the drills when the seed was sown.

(c) 75 lbs. per acre broadcast when the young plants were between six and twelve inches high.

(d) Control (no nitrate).

Each of the nitrate dressings was applied on quadruplicate plots, and the results are shown in the following tabulation:—

Yields of Maize in Bags per Acre.

	A. 75 lbs. with seed.	B. 150 lbs. with seed.	C. 75 lbs. on growing crop.	D. No nitrate.
	10.80	12.88	13.60	13.12
	13.04	13.04	12.80	13.76
	13.84	13.76	14.40	13.20
	15.44	11.60	12.24	13.36
Averages	13.28	12.82	13.26	13.36

These results failing to show any beneficial effect from the treatment, the method of applying the nitrate of soda was changed as follows during the season under review:—

(a) 100 lbs. per acre when the plants were 12 to 24 inches high.

(b) 100 lbs. per acre when the plants were nearing the flowering stage.

(c) 100 lbs. per acre in weekly applications of 25 lbs. each, commencing when the plants were 12 inches high.

(d) Control (no nitrate).

The whole area was previously dressed with 400 lbs. per acre of potassic superphosphate, and the relative nitrate dressings were applied on triplicate plots. The results obtained from the various treatments were as follows:—

Yields of Maize in Bags per Acre.

Stage of growth of plants when nitrate applied.	12in. to 24in. high.	Near to flowering.	After 12in. high at weekly intervals.	No nitrate.
	20.88	21.60	17.76	19.20
	19.92	20.88	21.84	19.68
	15.60	17.00	20.21	15.36
Averages	18.80	19.82	19.93	18.08

Although the average yields from the plots which received nitrate of soda were somewhat larger than those of the untreated plots, statistical analysis of these results shows that this evidence of increase due to treatment cannot be accepted without reserve. Further, as the increase at best was less than two bags per acre and the cost of the fertiliser was 16s., the nitrate in this form for the maize crop would not be profitable under normal conditions. It may be said, therefore, that no matter whether the nitrate of soda was applied in bulk at seeding time, or as a top-dressing during the growth of the plants, and even in the form of small and frequent applications during the growing period, it has failed to give an economic return.

The Relative Value of Sunn Hemp and Sunflower for Green Manure.—For a number of reasons Sunn hemp has become the most popular leguminous crop for use as a green manure in this Colony, but during recent years the scarcity and high cost of its seed has curtailed its use, and a number of farmers have been obliged to employ other crops instead. Of these the sunflower appears to possess considerable merit. Trials were commenced in 1928-29 to test the relative value of the two crops when used as green manure for the maize crop. Duplicate plots were sown to Sunn hemp and sunflower, and plots on which equal weights of seed of both crops were sown together were included. All plots were sown at the rate of 48 lbs. of seed per acre, and a dense stand resulted. Two crops of maize have been reaped since the green crops were ploughed under, and the mean annual yields of the two crops in bags per acre were as follows:—Sunn hemp and sunflower mixed, 13.74; sunflower only, 13.54; Sunn hemp only, 13.36. The difference between the yields is so small in comparison with that between plots treated alike that they must be ascribed

entirely to chance, but it is interesting to note that the sunflowers have given results equally as beneficial as those of the Sunn hemp, in spite of the nitrogen gathering powers of the legume.

These trials are being repeated in a new series in which the various treatments are replicated nine times, and meanwhile it must be borne in mind the density of the stands of sunflower obtained on this station is usually much heavier than that obtained by farmers who employ sunflowers as a green manure crop.

Ground Nut Fertiliser Trials.—The cultivation of this crop having increased somewhat during the past decade, the question has arisen as to whether farm manure or fertiliser can be profitably employed to increase the yields of nuts.

The results of experiments with farm manure are recorded in the annual report for this station for the season 1926-27. Owing to the small increases obtained, it was concluded that the limited amount of this manure usually available could more profitably be used on other crops, and in consequence experiments with artificial fertilisers were commenced in the season 1927-28. The results of the first and second series were fully reported on last season.

Third Series.—At the request of the Enterprise Farmers' Association, basic slag was included in this series of experiments, but, as the results of previous experiments indicated that nitrogenous fertiliser had no beneficial effect, the treatments were rearranged as follows:—

(1) Basic slag, 200 lbs. per acre.

(2) Superphosphate (19 per cent., P_2O_5), 200 lbs. per acre.

(3) Superphosphate, 200 lbs., plus muriate of potash, 50 lbs. per acre.

(4) No fertiliser.

Each treatment was given to four plots, each 1/32 acre in extent, arranged in the form of a Latin square, and the yields of each of the plots are shown below for season 1929-30 in the first column and season 1930-31 in the second column.

Yields in lbs. per Plot of 1/32 Acre.

	(1)		(2)		(3)		(4)	
	63	34	38	29	52	27	47.5	28
	64	32	62	35	70.5	36	37.5	24
	62.5	35	62	31	53.5	34	63.5	28
	55	34	71	34	53	35	61	27
Total yields for four plots ...	244.5	135	233	129	229	132	209.5	107
Total yields over two years ...	379.5		362		361		316.5	

Although the yields are considerably lower this season than last, there is much less variation among the yields of the plots which have been treated with the same dressing, and there is definite increase due to the phosphatic fertilisers, though no response to potassic fertiliser is indicated. Over two seasons the average increase from the fertilised plots equalled 408 lbs. per acre. If the value of this was 1d. per lb. it would amount to 34s. and would yield an appreciable profit on the outlay for phosphate. But the increased value of the crop is not fully revealed by the increased weight, because the fertilised crop produced a greater portion of large nuts, whose value is enhanced by their suitability for the confectionery trade.

Since the increase due to fertiliser was proportionately greater in the second season after its application, the experiment confirms those previously reported, in showing that while phosphatic fertiliser may be profitably used on soils of somewhat low fertility, there is little response to fertiliser treatment on land which has been maintained in a moderately high state of fertility, and that ground nuts do not respond to phosphate treatment to nearly the same extent as maize and several other crops. It is therefore considered that under normal conditions of soil fertility it will be found more profitable to follow with ground nuts after some other fertilised crop rather than to apply fertilisers direct to the nuts.

Ground Nut Variety Trials.—A previous series of trials showed that the varieties which yielded the heaviest crops under local conditions were Spanish Bunch, Virginia Bunch

and Jumbo, and these are now accepted as standard varieties for comparison with new strains which may be received from time to time. Two new sorts were included in our trials this season, one was derived from Spanish Bunch by selecting pods containing five kernels and the other was received through the courtesy of Mr. W. J. Richards, of the Native Department. The latter strain is named "Masumbika" after the headman who is said to have introduced it upon his return from a raiding expedition into northern territory. The majority of the pods (nuts) of this variety contain two or three kernels which are considerably larger than those of the Spanish Bunch, though slightly smaller than those of the "Jumbo" variety. The skin of the kernel is light pink in colour. The average size of the pods is larger than that of the other varieties, but they are less regular in outline and shape than Spanish Bunch pods.

The new varieties were planted in duplicate plots with Spanish Bunch and Jumbo as controls. The five-kernelled strain of Spanish Bunch proved equal but in no way superior to the ordinary stock. The yield of the Masumbika variety equalled that of the Spanish Bunch in weight, but, owing to their size, it is probable that a larger proportion of the crop could be marketed as selected nuts for use by the confectionery trades at enhanced values. The Jumbo variety yielded 18 per cent. more pods than the others, but owing to its procumbent habit the nuts are scattered over a larger area and were therefore more tedious to harvest. On this account, and owing to a somewhat higher percentage of immature nuts, the value of the extra yield is partially offset. The large kernels which this variety yields make it particularly suitable for some branches of the confectionery trade, and farmers who export selected nuts may well find in it a more profitable variety to grow than the Spanish Bunch or Virginia Bunch.

Soya Bean Variety Trials.—Several new varieties were *included in this season's trials,* but none have yet equalled the Otootan in yield of either fodder or seed. Below, the mean yields of triplicate plots are tabulated:—

Yields in lbs. per Acre, Season 1930-31.

	Otootan.	Herman.	Biloxi.	Chiquita.	Dixie.	Chinese White.
Hay	3,690	1,936	3,630	1,331	1,149	1,331
Seed	825	495	684	488	368	458

	Southern.	Virginia.	Uganda Yellow.	Uganda Black.	Soyolk.	Tokio.
Hay	847	1,210	2,420	484	968	2,089
Seed	380	345	380	143	278	698

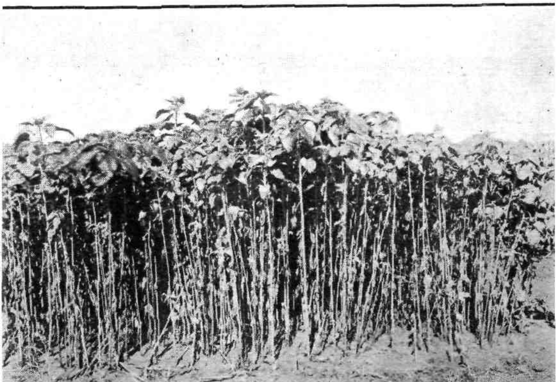
	Morse.	Brachet.	Brown.	Mammoth Yellow.	Goshen.	Black Eyebrow.
Hay	1,089	3,160	1,149	1,210	864	1,663
Seed	418	563	420	432	220	443

	American White.	George Washington.	Laredo.	Tarheel.	Mammoth Brown.
Hay	1,270	1,089	1,270	1,870	2,663
Seed	418	390	364	510	660

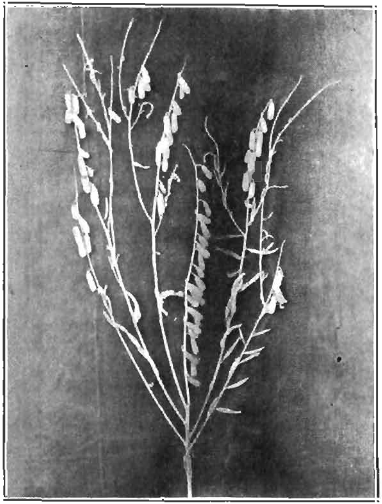
A considerable number of strains which appear to have arisen through the natural crossing of Otootan with Biloxi were segregated three years ago, and have been tested during the past two seasons. *Several of these appear to be* somewhat superior to either of their parents, but they need a further period of trial before more can definitely be said of them.

Sunn Hemp.—This crop has proved most valuable for use as a green manure, and although it has been sown on

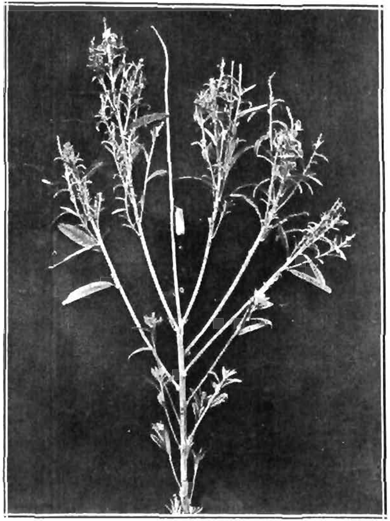
Sunn hemp v. sunflower in green manure trials. Left: pure stand of Sunn hemp. Right: Sunn hemp and sunflower mixed. The two crops grow at approximately the same rate, and the mixture proves very suitable for use as a green manure, and less costly to sow down than a pure stand of Sunn hemp.



Sunn hemp v. sunflower as green manure crops. By seeding the latter at the rate of about 48 lbs. per acre a dense stand with thin stalks suitable for ploughing under has been obtained.



Sunn hemp selections. Many types have been segregated from plants like the one illustrated, with the object of procuring strains which will yield larger quantities of seed than the common variety.



Sunn hemp selections. One of the causes of low yield is that a large proportion of the plants produce mostly sterile flowers. The reason for this abnormal condition is not known, but a seed-borne virus disease is suspected.

increasingly large acreages during recent years, its employment has been curtailed to some extent on account of the small seed yield and consequently high price of seed. Investigations have, therefore, been undertaken during the past two years with a view to increasing the yield of seed, since this would enable farmers to use it even more freely, as well as to reduce the general cost of green manuring. The successful solution of this question, therefore, has a direct bearing on the cost of maize production.

Pruning as a means of Increasing Seed Production.—It is the practice in parts of India to beat the tops of growing Sunn hemp plants with sticks, and it is claimed that by retarding growth in this way, and perhaps, too, by producing increased branch development, the crop may be induced to bear more seed. In the trials made at this station, growing plants were once pruned at three different stages in their development, when from four to six inches of their top growth was removed, viz.:—

(a) Plants 12 inches high pruned back to 8 inches high.
(b) Plants 24 inches high pruned back to 20 inches high.
(c) Plants 36 inches high pruned back to 30 inches high.
(d) Control, not pruned.

Each of the various treatments was practised on quadruplicate plots during the two seasons 1929-30 and 1930-31. It was observed that the treatment induced branching, and retarded maturity by a few days. The following tabulation shows the results of these experiments, the yields recorded being the means of quadruplicate plots:—

Yields of Sunn Hemp Seed in lbs. per Acre.

	Season 1929-30.	Season 1930-31.	Average two seasons.
Plants 12 ins. high reduced to 8 ins.	469	570	520
Plants 24 ins. high reduced to 20 ins.	674	663	669
Plants 36 ins. high reduced to 30 ins.	627	735	681
Control	675	830	753

This experiment has failed to produce evidence in favour of pruning the crop; on the other hand, the practice appears to depress the yield.

Distance-planting Trials.—It is generally accepted that a reduced yield of seed results when a stand is either too dense or too sparse, and these trials were laid down to investigate this aspect of the problem of seed production. Seed was sown in rows at three different distances apart, namely, 9 inches, 18 inches and 24 inches, with the plants spaced at two to three inches apart in the rows in each case. The results of two seasons' trials on quadruplicate plots are shown in the tabulation below:—

Yields of Sunn Hemp Seed in lbs. per Acre.

Distance between rows.	Approximate amount of seed per acre.	Season 1929-30.	Season 1930-31.	Average two seasons.
9 ins.	36 lbs.	953	1,485	1,219
18 ins.	18 lbs.	956	1,320	1,138
24 ins.	14 lbs.	807	1,530	1,169

The yields obtained at the various distances apart and rates of seeding are seen to be approximately the same in all cases, and it would seem that within reasonable limits the density of the stand has little effect on the yield of seed.

During the early stages of growth this crop is often attacked by the leaf-eating Exosoma beetles, which, it was suggested, might be the means of transmitting a virus disease resulting in abnormal growth and low seed production. To investigate this point, duplicate plots were kept free of insects, while others were subjected to their attack. Quadrats on which "Complete" fertiliser was applied were superimposed on these trials. The whole crop grew luxuriantly and appeared normal until the flowering stage was reached, when it was observed that a large proportion of the flower-buds fell to the ground unopened, and that many of the flowers which opened were sterile. The plants behaved in this abnormal manner over the whole of the area employed for this trial, irrespective of fertiliser

treatment and protection from insect attack. Although the crop attained a height of eight feet and continued to produce flowers over a period of three months, seed production was confined to a few individual plants around the edge of the block of plots, and amounted to a few pounds per acre only. The reason for the sterility of this crop has not been ascertained, but it is thought that a seed-borne virus disease may have been a contributing cause, and possibly that the virulence of this was increased through the vitality of the plants becoming impaired by the cessation of rain at a critical stage, viz., when they were growing luxuriantly and commencing to flower.

It is noteworthy that a satisfactory crop was produced from the same stock of seed, planted on the same day on another less fertile area, and, further, that, in other seasons, a normal crop has been taken from this land, indicating that the soil did not lack any of the constituents necessary for the crop.

Heavy-bearing Strains.—Another means which is being employed to overcome the low yield problem is the establishment of individual strains from promising plants. Two years ago several strains were segregated for this purpose, and the past two seasons' results indicate that some of these are capable of yielding fifty per cent. more seed than the common variety. If next season's results are equally satisfactory, small quantities of seed will be issued to farmers for more extended trial.

In addition to these selections, some new Indian varieties have been received through the courtesy of Mr. A. S. Laurie, of Concession, which promise to yield considerably larger quantities of seed than the kind commonly grown in this Colony at present.

Wheat Varieties.—Five varieties of wheat were sown on the 30th December, 1930, and with the exception of "Mentana" all made satisfactory growth until they reached the flowering stage. Soon after that, however, they all became heavily infected with "rust," with very detrimental effect on the quantity of the grain.

Mentana and Huron failed to produce any seed, while the others yielded as follows:—Kenya B 286, 999 lbs.; Reward, 918 lbs.; Kenya Governor, 693 lbs. per acre.

Sweet Potato Variety Trials.—No new introductions of this crop having been made recently, only those varieties grown in previous years were included in the trials. The results of which, on the whole, support previous tests, though the variety known as "Linslade" has yielded even better than in previous years. This strain has produced both vines and tubers in large quantities over a period of five years, and as a dual purpose variety is possibly slightly superior to the others mentioned.

Yield in lbs. per Acre.

Name of Variety.	Average weight of tubers over 9 years.	Average weight of green tops over 9 years.
Early Butter	16,521	15,849
Calabash Leaf	12,781	20,492
Common Pink	17,233	12,715
	(over 6 years)	(over 6 years)
Linslade	17,192	18,116
	(over 5 years)	(over 5 years)
Oklahoma	9,119	13,688
	(over 3 years)	(over 3 years)
Yellow Jersey	13,744	9,017
Southern Queen	12,996	17,825
Porto Rican	8,885	13,178

For the past five years a part of each plot in the variety trials has been allowed to remain down, with the object of ascertaining the advisability of relying on a volunteer crop for the second year. It has been found that the yields of the second crops have been somewhat less than those of the first, but on the whole very satisfactory results have been recorded. The second season's tubers are usually smaller than those of the first season, and unless care is taken to reduce the stand of volunteer plants to approximately one plant to each half square yard, it may be found that the resulting return will consist of numerous small tubers whose lack of size may considerably reduce their value.

Sweet Potatoes: Volunteer Crop.—

Yield of Tubers in lbs. per Acre.

Name of Variety.	First year's crop for comparison.	Volunteer crop, 1930-31.	Average of six seasons' volunteer crops.
Early Butter	16,608	4,820	10,576
Common Pink	20,668	5,054	9,568
Calabash Leaf	10,728	5,481	5,723
Red Nancemund ...	7,536	3,948	5,759
Linslade	17,409	8,964	9,608
Oklahoma	8,337	6,426	5,091

These returns indicate that some varieties are more productive than the others during the second year, and over the five-year period, Early Butter, Linslade and Common Pink have consistently produced heavier volunteer crops than the others, thereby proving their superiority as producers of tubers, though the Calabash Leaf has maintained its lead for the production of green tops.

The yield of green tops from the volunteer crop averages slightly less than that of the first year, in spite of the advantage they have in being able to commence their growth earlier in the season.

During the course of these trials it has been noticed that the foliage of a volunteer crop is more frequently attacked by insect pests than that of the first crop. This fact, combined with decreased yields and the difficulty experienced in keeping the land free of weeds, affords sufficient reason for not leaving the crop down for more than two or, at most, three seasons.

Canna and Legumes grown together for Fodder.—The succulence of the canna crop renders it a useful stock food, but in order to balance the excess of starch it contains, protein needs to be added to the ration. For this reason it was thought that by interplanting canna and leguminous fodder crops a better balanced ration might be obtained. To ascertain whether this would be feasible, cannas were planted in rows 80 inches apart by 36 inches in the rows in October, 1929, and in the following December on one half of the plot dolichos beans were sown between the rows, and on the other half a mixture of Soya beans and wedge peas.

Owing to the type of growth of the plants being different, this combined system of cropping appeared to be very satisfactory. The sturdy upright growth of the canna gave shelter and support to the legumes, which, in turn, by providing a canopy over the ground, prevented evaporation of soil moisture through the action of sun and wind. The wedge pea reached its maximum growth at the beginning of March, the Soya beans were a month later and the dolichos beans remained succulent until the end of May. The legumes were cut and weighed when they reached maturity, and their yields of fresh material per acre were found to be as follows:—Wedge pea, 1,080 lbs.; Soya beans, 3,180 lbs.; dolichos beans, 4,980 lbs.; canna tops, cut 30/5/30, yielded 9,344 lbs. per acre.

The canna tubers were not lifted at the close of the first season, and legumes were again sown in season 1930-31, when, owing to competition with the previously established canna and the early cessation of the rains, the legume growth was very considerably less than that of the previous season. When it is desired to leave the canna down for more than one season, therefore, it would appear advisable to remove alternate rows after the first season, or to space the rows from 10 feet to 12 feet apart in the first instance, in order that in the second season the legume crop may be sufficiently heavy to effectively raise the protein content of the mixed fodder.

The results of the experiment indicate that this system or variations of it may well prove suitable for those who require a crop for pigs or other live stock during the period March to May or even later in frost-free situations. It appears to be particularly well adapted for pig farmers, since by this means a well balanced ration which should not require much augmentation should be provided, whereby the expense of harvesting and transporting the crops to the piggeries would be saved.

Aloe Pienaarii (Lobatsi, Bechuanaland, variety).

Aloe Pienaarii (Rhodesian variety).

NOTES ON AFRICAN ALOES.

By H. Basil Christian, Ewanrigg, Arcturus.

PART II.

Aloe Pienaarii (Rhodesian variety).—This aloe was first recorded from Smit's Drift near Pietersburg in the Northern Transvaal.

A variety of it occurs in Southern Rhodesia, and so far has been recorded from the Victoria Falls, where it occurs in considerable numbers, the Northern Umvukwes and Salisbury districts in small colonies, the lower Mazoe Valley and the valley of the Mtaradza Falls in great numbers and a small colony at the upper end of the Sabi Gorge.

It is generally found on granite kopjes often in the shade of trees, and occasionally in open, flat country.

It is one of the slowest growing of all aloes, and does not throw out suckers from its base.

It is an acaulescent plant, or with a short stem, having long, narrowish dark green leaves and with up to four branched chocolate-coloured peduncles.

The flowers of the type are at first scarlet, greenish at the tips, which become citron yellow when open.

The Southern Rhodesia variety has longer racemes not so densely flowered as the type. The colour of flowers a darker red, greenish at tips, which hardly change to yellow.

In Southern Rhodesia the flowering period is from June into August.

Aloe Pienaarii (Lobatsi, Bechuanaland, variety).—This aloe occurs near Lobatsi, Bechuanaland, and differs from the type in having light glaucous green leaves similar to *A. Wickensii*.

The racemes are densely flowered as in the Transvaal species, and differ in this respect from the Southern Rhodesia variety.

The perianth when open becomes yellow for about one-third of its length.

It flowers in July and August.

Aloe Wickensii.—This aloe occurs in M'Phathlele's location, N. Transvaal. In habit of growth and shape of leaves it much resembles *A. Pienaarii*, but the colour of the leaves is a pale glaucous green.

The inflorescence often consists of 2-4 flowering stems from same rosette of leaves.

The peduncles are chocolate brown in colour.

The perianths are at first red, becoming bright lemon yellow when open, which makes it a much more striking-looking aloe than *A. Pienaarii*, which it so much resembles. Like the latter, it is very slow growing, and does not throw out suckers.

Flowering period in Southern Rhodesia July into August.

HANDBOOK OF TOBACCO DISEASES.

Attention of readers is drawn to the fact that the Department of Agriculture has found it most inconvenient, with the present shortage of staff, to handle the local sales of this book. Arrangements have therefore been made with the Rhodesian Printing and Publishing Company for distribution by them throughout Southern Rhodesia. The book may be obtained from the Herald Store, Salisbury, price 4s., or, postage paid, 4s. 4d.

Aloe Wickensii.

POULTRY INDUSTRY.

CARE OF YOUNG STOCK IN HOT WEATHER.

By H. G. Wheeldon, Chief Poultry Officer.

Chicken Flagging.—A steady, sustained growth from start to finish in the season's young stock is of such great importance that no one can afford to allow it to lapse. The first two or three weeks may be said to cover a critical stage in the life of the chick, and having survived that period, chicks should grow steadily, if assisted by favourable environmental conditions and, of course, generous and judicious feeding. Steady, normal growth in warm weather is largely dependent upon hygienic conditions, ample ventilation and room in the sleeping quarters, with spacious yarding or free range facilities.

During the hot weather one frequently bears complaints to the effect that the chickens have stopped growing. They have ceased to make visible progress day by day and seem listless and wanting in vigour. In the case of chickens that have just completed growing their first plumage, a temporary cessation of growth may be expected; this is transitory and soon passes, but that which is referred to here as "flagging" may occur at earlier or later stages, and may be brought about by various causes. In examining this condition it is necessary to generalise to some extent on the more common causes, as there are so many varying conditions under which chicks are raised that no hard and fast rule can be laid down to cover all the conditions.

Young chickens will flag if kept confined to the brooders and brooder runs longer than is necessary in warm weather. The inexperienced rearer frequently overlooks the fact that the brooding methods and conditions that have served the

purpose very well a few weeks previously in the cold weather may be quite unsuited to the warmer months. A lack of ventilation or overcrowding the sleeping quarters are probably the most common causes of flagging amongst young and old chicks in warm weather. The atmosphere in the sleeping quarters at night should not be moist, hot or sweaty, as this indicates insufficient ventilation, which will in due course cause exhaustion, followed by flagging. This overcrowding not only retards growth, but it is conducive to catarrhal troubles. A common complaint often called "Summer colds" is frequently the result of too close confinement and overheating in the brooders or colony houses due to improper ventilation. The sleeping quarters should be inspected two or three hours after dark, when the necessary final adjustments can be made for the night.

Chickens may become droopy and listless through monotony; this is brought about by too close confinement in the same runs week after week or on stale ground, which is apt to check the growth of chicks as effectively as improper feeding. During the closing period of the breeding season, especially when large numbers of chicks have been raised on the same ground, it would be to their advantage in warm weather to adopt colony houses for free ranging the young stock on fresh ground. Growing stock require liberal range, and where available a shady grass-covered field, previously mowed, would furnish suitable conditions. Access to an orchard will also provide shade and other essential requirements in hot weather. If free ranging conditions are not available, care should be exercised to avoid overcrowding the runs. A common error under semi-intensive conditions is over-stocking the poultry plant. Rigorous culling and confining the stock in small rather than large numbers together cannot be too strongly emphasised if the healthy growth of chickens is to be maintained. There are other contributing causes of unthriftiness which may be overlooked, such as insufficient food, the confining together of chicks of various ages and sizes, neglect to separate the sexes, insect vermin and lack of cleanliness. The consistent maintenance of cleanliness in the brooders, houses and runs is an important essential for the well-being of growing stock. Insect vermin become very active as the

weather warms up, and will soon cause droopiness and an unthrifty condition in an otherwise healthy flock of chickens. Lice and red mite will attach themselves to the head and body of the chicks and sap their vitality. The natural method for all birds to suppress and free themselves of vermin is by dust-bathing; provision in this respect should be made to enable the chicks to dust themselves or wallow in moist soil; this, in addition to general cleanliness, is the best preventative. Failing this, the spraying of coops and treating the birds with insect powder should become a regular practice in the management when lice and other insect vermin have made their appearance. As far as possible, chicks of the same age and sex should be housed together in groups not exceeding 50 birds. The cockerels should be housed in separate runs or on range away from the pullets.

The remedies for flagging in young stock are obvious. Chicks that do not "get on" often derive some stimulus by a change to larger premises or moving them to fresh ground, and a change of food, such as moist mash, occasionally acts like a tonic. A little raw minced meat and plenty of succulent green vegetable food or young onion tops may be included also as part of the bill of fare for chicks hatched at the end of the season. A regular supply of green food is important in warm weather. The object of the poultry farmer to-day is to economise in almost every branch of this business, but there is one place where stinting is false economy, and that is in the feeding. It is important to hatch and rear the number of stock that can be fed and reared properly. It is much better to hatch fewer birds and feed them well rather than a large number which are likely to be underfed.

Sanitation.—Sanitation checks disease and must be regarded as one of the important considerations in successful chick rearing. Many common diseases and troubles of both old and young stock can be avoided by following sanitary principles. Proper sanitation means raising chicks on fresh ground by moving the brooder from place to place or digging over and cropping contaminated ground, or the permanent rearing pens in the off-season, cleaning and renewing the litter as may be necessary, consistent cleaning

of the utensils and disinfecting the brooders after each lot of chicks are weaned.

Cannibalism or Toe Picking.—Cannibalism is often associated with poor hatching or close confinement in the brooders of young chicks, and is often brought on in older chicks by a lack of exercise and animal food or other deficiencies in their ration. Much of this trouble can be avoided by brooding chicks in small lots or by getting them out of doors as much as possible, by giving them proper nutrition and providing them with some means of keeping them busy. Plenty of protein and green food are essential; sprouted cereals in a little soil contained in a shallow, wire-covered box and placed in the chick runs or brooder house will help to keep the chicks busy.

Attention to Details.—Chicks are delicate during the early period of their life, especially in cold weather, and attention to details will count in their successful care. Recommendations in the care and management will not give satisfaction without the use of good judgment on the part of the attendant. Any methods which have proved satisfactory in the past should be carried out with a definite plan in the management.

In the rearing of chickens common sense and observation are particularly important to prevent mortality and raise to maturity profitable layers for the future.

SOME CONSIDERATIONS ON QUALITY IN WHEAT.

By H. WENHOLZ, B.Sc.Agr., Director of Plant Breeding, New South Wales.

From the time William Farrer supplanted the very late soft wheats of low quality in Australia with Federation and other varieties of better quality at the beginning of the present century, there has been a growing interest in the quality of Australian wheat. Despite the production of Farrer wheats of very high quality, such as Comeback, Bobs, Cedar, Jonathan, etc., these varieties never made much headway in commercial culture against the more productive varieties (Federation, Yandilla King, etc.) of medium weak or medium strong flour quality, which at present constitute Australian wheat.

Because of changes, chiefly in the direction of greater mechanisation in the baking industry, which have taken place throughout the world in recent years, the demand for wheat or flour of high baking quality has become more widespread, and this demand is now becoming more insistent in Australia. Every now and then millers, merchants and bakers handle a sample of Comeback or some other variety of specially high quality grown for show or special exhibition purposes in Australia, and realising its excellent baking value, urge farmers to grow such wheat commercially.

The whole question of wheat or flour quality is of such wide interest and is receiving such general attention that the wheat breeder, who really holds the key to the future situation as to the quality of new varieties, is justified in examining the position in Australia in the light of recent developments and in taking whatever action seems necessary or advisable.

Conflicting Interests.—On account of the present low world prices for wheat, the Australian wheat-grower is in the *midst of (or, it is hoped, is passing through) one of the most* difficult periods of his career, and he needs now, more than ever, every possible political, economic, technical and practical assistance, in addition to the greatest efficiency on his own part, to make wheat-growing profitable or to enable him to remain in the industry.

The particular variety or varieties of wheat grown play a big part in the wheat-grower's profits or returns from his crop, and he needs to make his choice of these varieties with the greatest consideration. In Australia, wheat is not graded for market, but is sold on an f.a.q. (i.e., fair average quality) standard, based almost entirely on bushel weight. Wheat that has a lower bushel weight than the f.a.q. standard is subject to price dockage, but the grower does not get any premium for wheat of higher bushel weight than the f.a.q. standard. The milling quality, a term which has been used in Australia as synonymous with baking quality, is not considered in determining the f.a.q. standard, and, except in a few instances, millers do not generally give any premium for wheat of high flour strength or baking quality. The farmer's chief consideration, therefore, in the choice of a variety is bushels per acre. The only other consideration is that the grain should not, if avoidable, suffer damage or deterioration from disease (rust, smut, etc.) drought, weather damage (bleaching, etc.), which will decrease its bushel weight below that of the f.a.q. standard.

The grain merchant naturally likes to handle as much grain as possible above f.a.q., for which he seldom pays an increased price, as it can, if desired, be blended with wheat below f.a.q. purchased at a lower price to make an f.a.q. sample. He is also naturally interested in wheat of high flour quality, since most of his sales go eventually to millers chiefly overseas, who desire a general improvement in flour quality. The local flour miller usually buys his requirements direct from the farmer.

The miller is chiefly concerned with the cleanliness, soundness, plumpness and brightness of the grain, which

he desires to be easy to mill and to yield a high percentage of flour, if possible, of good baking quality.

The baker desires a flour of standardised or uniform quality, of good colour and of high water absorption from which a large number of loaves can be made from a given weight of flour, and which is also capable of giving a loaf of large volume and of good texture.

Each of these people look to the wheat breeder to evolve the type of wheat they desire, without much thought or consideration for the other people concerned. The breeder must give serious consideration to the type of wheat evolved, and it is his duty to bring about some measure of unity, if possible, between these apparently different or conflicting requirements of the farmer, grain merchant, miller and baker. Since it takes about ten or fifteen years from the time a cross or selection is made by the wheat breeder before the new variety comes into general cultivation, a heavy responsibility thus rests on the breeder, and his efforts must be directed as early as possible into the wisest course.

There are many other characters which the breeder must consider in breeding new varieties of wheat, such as disease resistance, strength of straw, grain holding capacity, drought resistance, etc., but we are dealing here with the question of grain or flour quality, and we shall attempt to see how far it seems possible to secure the compatibility of all interests in a breeding programme.

To begin with, let us try and understand more clearly what is involved in the term quality or strength, as applied to wheat grain or flour.

Character of Grain and Baking Quality.—The baking quality of wheat flour is generally defined as its capacity to produce loaves of large volume and of good texture and colour. It is well known that the most important factor in the determination of flour quality or strength is the gluten, in which the nitrogenous portion of the flour is chiefly contained. It is not only the quantity of gluten, but also (perhaps chiefly) its quality, which is of importance in determining the baking quality or strength of the flour. A flour which contains a large quantity of gluten of good

quality has a capacity to absorb a large quantity of water, and also yields dough which is sufficiently tough and elastic to stand a large amount of kneading, and also to be capable of holding the gas generated in the leavening process.

To explain most simply the effect of gluten on baking quality, the gluten may be regarded as comprising the walls of a cell which is being subjected to pressure from within by the expansion of gas created by the yeast organisms in the dough. A low percentage of gluten in the flour means that the cell walls are thin, and not being able to withstand a high pressure, give way and allow the gas to escape. Such a flour does not make a loaf of good volume. A high percentage of gluten in the flour will give thick cell walls, which may stand pressure well and give a well risen loaf. The gluten may, however, be present in sufficient quantity to make thick cell walls, but it may be of poor quality, having insufficient elasticity to stand much stretching without breaking. In this case also the gas escapes and the resultant loaf is not of large volume. A high pressure is tolerated by cell walls of high elasticity, which accompany gluten of good quality. The highest loaf volume and the best loaf texture are therefore generally attained with flour containing a high percentage of gluten of good quality.

The appearance and texture of the grain bear some relation, but are only a rough guide, to the quantity and quality of the gluten it contains. Soft wheat is of opaque appearance and of low gluten content, and being generally also of low gluten quality it is of poor baking quality, and is said to possess weak flour. Hard wheat is generally of horny, translucent or vitreous appearance (though some hard grain may be dull and opaque). It cannot be assumed, however, that all hard grain has the highest quantity or quality of gluten. It is for this reason that tests are necessary to determine both the quantity and quality of gluten in wheat. Strong flour wheats are those which are good in both these characters and which are therefore of good baking quality.

The protein content of the grain, however, bears a close relation to the quantity of gluten contained in the flour. High protein wheat is considered in U.S.A. to be so-

generally indicative of good baking quality that premiums are paid for such wheat in that country.

Factors Influencing Grain Quality.—The term quality as applied to grain may here be taken to mean the baking quality of the flour milled from it. Thus, grain quality depends on both the quantity and quality of its gluten. The actual quality of the grain produced is determined by both heredity and environment, i.e., chiefly by the kind or variety of wheat and the climatic and soil conditions under which it is grown.

There is reason to believe that quality of gluten is an inherent character which is not modified to any appreciable extent by environment. On the other hand, the quantity of gluten in a sample of wheat is determined both by environment (chiefly climate) and by heredity (the variety). Durum or macaroni wheats are generally of comparatively high protein or gluten content, but the quality of the gluten is usually poor. The protein content of these wheats is influenced to some extent by the climate in which they are grown, but the climate has no appreciable effect on the quality of their gluten. The original Red Fife wheat of Canada has gluten of inherently good quality, and this character has been transmitted to many of its offspring, e.g., Marquis, Reward, Garnet, Yeoman, Comeback, etc. The protein or gluten content of these wheats is generally good, but it is influenced markedly by climate. The climate has probably a greater influence than that of heredity (variety) on the protein or gluten content of the wheat, but its influence on gluten quality is insignificant by comparison with that of the variety or kind of wheat.

Climate is the chief factor in the environment which influences grain quality and texture. Wheat grown in countries or districts where the maturing period is prolonged by cool moist conditions is soft in texture and poor in gluten content in comparison with the hard wheat produced in warmer and drier regions. The slow ripening prolongs the retention of chlorophyll and the elaboration of starch and its translocation to the grain, while quick ripening tends to prevent this, and the diminished starch content promotes a higher protein content and a harder grain. Thus late-maturing wheats tend to be softer than early-maturing

wheats, but the texture and quality of the grain are more greatly influenced by the period of kernel development than by the total length of the growing period.

Of course it must be realised that a prolonged ripening period which favours the production of soft grain also corresponds with high yields, and it therefore seems that high yields and high quality grain are not compatible. Any attempt by the breeder to increase the quality of wheat too greatly may therefore result in loss of yield. This would probably be the case, especially in late-maturing varieties or in cool districts.

Soils rich in nitrogen naturally tend to produce harder grain of higher nitrogen content than soils poor in nitrogen, unless they favour high moisture retention and slow ripening. The application of nitrogenous fertilisers has a similar effect in some countries. Similarly, soils in which nitrification is active yield better quality grain than those of poor nitrifying character, and for this reason fallowed land generally produces grain of somewhat better quality than stubble land of similar character. The intake of nitrogen by the plant during its growth (especially during its early growth) also influences the protein content of the grain, and this is why, other things being equal, a mild dry winter gives grain a better quality than a cold wet winter—really a question of nitrification in the soil and the abundance and availability of nitrogen to the plant in its early growth. (N.S.W. Ag. Gaz., August, 1932.)

THE TREATMENT OF INTESTINAL PARASITES OF SHEEP.

By J. D. Coutts, M.R.C.V.S., D.V.S.M.

The great drawback to successful sheep farming in this Colony is the loss of animals due to the ravages of gastro intestinal parasites. The infection is gathered by the animals while grazing.

The internal parasites with which we have to deal do not multiply within the alimentary canal of the host. Thus the degree of infestation of the host is directly proportional to the degree of infection existing on the grazing ground.

It will, therefore, be apparent that whatever therapeutic treatment is adopted must be palliative only, unless adequate measures to reduce the number of viable larvae in the veld are undertaken at the same time.

As far as is known at present, probably the most satisfactory combination of drugs used for the control of internal parasites of sheep is a mixture of the following:—

Carbon Tetrachloride	3 c.c.
Oil of Chenopodium	2 c.c.
Copper Sulphate	20 grains

The above is the dose for an adult sheep in fair condition. Half the above quantities may be used for lambs six months old and over. For lambs six weeks to six months old 5 grains of Copper Sulphate only is used.

The above doses should be given in one ounce or more of water.

Precautions to be observed in dosing.—For at least a fortnight prior to treatment a bone flour lick must be fed to the flock. A suitable lick is composed of: Bone flour, one part, and coarse salt, four parts.

The doses mentioned above are the maximum tolerated, and the greatest case must be observed in measuring and in weighing out each dose.

Not more than five animals from a flock should be dosed until it is shown that they can stand the treatment. Care should be exercised in the dosing, the mixture to be thoroughly shaken up and administered slowly.

Old and debilitated animals are not suitable subjects for treatment, and if dosed are likely to collapse. After dosing, lambs frequently show marked tympany, but this *condition shortly disappears.*

Animals need not be starved prior to treatment.

Interval of Re-dosing.—It is believed that the control of the stomach worm is the all-important factor, and with this object in view, the dose of Copper Sulphate may be repeated at seven-day intervals to all adults in which diarrhoea persists, and to all lambs which have lost their bloom. The other drugs must not be repeated.

It is well to remember that the internal parasites of sheep are similar to those found in cattle, and unless the treatment of all herhivora which graze the same veld (particularly the young calves) is undertaken at the same time, and in conjunction with adequate measures to reduce the number of viable larvae in the veld, the complete eradication of these parasites cannot be hoped for.

The above mixture is unsuitable for calves.

AGRICULTURAL STATISTICS FOR THE SEASON 1930-31:

(a) LIVE STOCK; (b) CROPS GROWN BY EUROPEANS IN SOUTHERN RHODESIA.

Compiled by the GOVERNMENT STATISTICAL BUREAU.

[The following particulars have been taken from the report of the Government Statistical Bureau in regard to live stock and crops grown by Europeans in Southern Rhodesia for the season 1930-31. The complete report will be published in the usual form later in the year, but it is anticipated that the following extracts will be of interest to readers.—Ed.]

(a) LIVE STOCK.

In reviewing the statistics collected relative to the live stock of the Colony at 31st December, 1931, and the industries connected therewith, the main feature is the complete stoppage of the cattle trade due to the outbreak of foot and mouth disease.

These restrictions are responsible for a considerable increase in the total number of cattle, the total number of European-owned cattle having increased by 43,818 or 4.8 per cent., compared with 8,180 or 0.9 per cent. in 1930. Pure-bred cattle decreased by 1,643 head, but this is probably due to the fact that some farmers have been entering their grade cattle under this heading, as details of grade cattle were obtained separately for the first time in the year under review. As in previous years, the figures given for European-owned stock are exclusive of small urban owners and transport cattle employed on mines, roads and kindred activities. Native-owned cattle, as estimated by the Native Department, show an increase of 4.5 per cent., compared with 4.2 per cent. in 1930. Amongst small stock, poultry

show a substantial increase, but sheep, goats and pigs show decreases.

As regards the dairy industry, it is satisfactory to note that there were increased sales of milk and butter. The amount of cream and cheese is slightly less than in the previous year.

Of other farm products, eggs, bacon and ham and wool all indicate increased production.

Cattle.—The total number of cattle returned as owned by European farmers and ranchers was 954,161; the number of cattle owned by natives, according to estimates supplied by the Native Department, amounted to 1,628,299, making a total for the Colony of 2,582,460, compared with 2,468,418 in 1930.

The increase among European herds amounted to 43,818 or 4.8 per cent., a result which has already been commented upon.

Local consumption for the year shows a decrease, the total being 82,683, compared with 108,643 head in 1930, a decrease of 25,960 or 24 per cent. Of the above total 75,486 were slaughtered by butchers and 7,197 on farms.

The total number of deaths reported during the year under review was 58,124, a total death rate of 6.1 per cent. compared with 41,009 in 1930, representing a rate of 4.5 per cent. There were more deaths from poverty, the total being 29,346, compared with 10,843, and the rate increased from 1.5 per cent. to 3.1 per cent. The numbers under the heading "deaths from disease" rose from 17,159 to 19,297 in 1931. Deaths from accidents and wild animals show a decrease of 232.

In addition to the losses from deaths, 4,156 head of cattle were reported as lost or stolen during the year, an increase of 379 on those shown under this heading in 1930.

Imports and Exports.—Owing to the outbreak of foot and mouth disease in April, there was practically no trade in cattle during the remainder of the year.

Number of Cattle Owners.—The total number of cattle owners at the end of 1931 was 2,821 compared with 2,660 in 1930.

Pure Bred Cattle.—The number of cattle classed as pure bred show a decrease of 1,643 head or 10.7 per cent., compared with an increase of 551 or 3.8 per cent. in 1930. This decrease is in all probability due to the practice adopted by some farmers in previous years of including high grade stock under the heading "pure bred." This decrease is particularly noticeable in the case of Frieslands, the total number of this breed shown as pure bred having dropped from 3,898 to 2,518 head.

Grade Cattle.—The number of grade cattle was asked for in the returns for 1931 for the first time.

The total number was 122,306, of which 60,364 were cows, 28,661 were heifers over one year, 28,997 calves under one year, 2,977 bulls in use and 1,307 other bulls.

Equines.—During the period under review European farmers owned 2,618 horses, 1,450 mules and 11,795 donkeys.

Sheep.—European farmers owned 86,732 sheep in 1931, which was a decrease of 4,747 on the previous year's figures. The native-owned sheep show a substantial increase from 268,880 in 1930 to 288,770 in 1931.

The total death-rate amongst European-owned animals (exclusive of animals lost) was 14.4 per cent., compared with 10.8 per cent. in 1930. The death-rate from disease was 8.0, compared with 7.3 per cent. The local consumption was 42,297, of which 37,880 were slaughtered by butchers and 4,417 on farms.

The number of sheep imported was 26,642, a decrease of 3,552 and the exports totalled 743, a decrease of 2,807. Exports of skins show a decrease, the total weight exported was 60,854 lbs., valued at £1,325, compared with 122,884 lbs., valued at £2,286 in 1930.

The total number of farmers owning sheep was 818, of which number 284 had flocks of 100 animals and over. Forty-five farmers reported a clip amounting in the aggregate to 62,145 lbs.

Goats.—The total number of goats owned by European farmers shows a decrease from 9,636 in 1930 to 8,606 in 1931. The number of native-owned goats, on the other

hand shows an increase from 752,295 in 1930 to 761,583 in 1931.

Pigs.—*The* number of European-owned pigs showed a decrease from 25,536 in 1930 to 22,085 in 1931, whereas the number of native-owned shows an increase from 40,946 in 1930 to 45,795 in 1931.

The local consumption showed an increase from 18,323 in 1930 to 20,207 in 1931.

ANIMAL PRODUCTS MADE AND SOLD.

(1) **Milk and Milk Products.**—*Milk.*—The sales of milk as milk reported by farmers amounted to 1,182,366 gallons, as compared with 1,008,854 gallons.

Cream.—Sales of cream reported by farmers totalled 234,418 gallons, which when compared with the cream bought by creameries appears to be slightly under-stated.

Butter.—Farm butter sold amounted to 442,815 lbs., compared with 403,780 lbs., an increase of 39,035 lbs. Butter produced by creameries amounted 1,377,105 lbs., compared with 1,364,921 lbs. in 1930, an increase of 12,184 lbs. Exports of butter amounted to 645,247 lbs., valued at £45,072. Imports amounted to 101,005 lbs., valued at £6,661.

Local consumption of butter, calculated on the basis of production and stocks at beginning of year, plus imports, minus exports and minus quantity in cold storage at end of year, gives a figure of 1,210,214 lbs.

Cheese.—The production of cheese in 1931 amounted to 146,261 lbs., compared with 163,382 lbs. in 1930. Imports amounted to 178,032, and exports to 13,474 lbs., the total consumption for the year amounting to about 310,819 lbs.

(2) **Other Animal Products.**—*Pork Products*—Bacon, etc.—The total amount of bacon and ham produced by the factories was 459,593 lbs., an increase of 37,728 lbs. on the production for 1930. Bacon and ham produced on farms amounted to 41,955 lbs., an increase of 11,408 lbs.

Imports amounted to 302,342 lbs. and exports amounted to 77,779 lbs.

Sheep Products.—Wool: The total clip of wool reported by farmers was 62,145 lbs., an increase of 1,898 lbs. Exports of wool amounted to 35,028 lbs.

Poultry.—The number of birds owned by farmers has increased from 258,399 in 1930 to 268,711 in the year under review.

Although this total includes all the larger poultry breeders, it by no means represents the total number of poultry in the Colony, as it does not include small owners in towns and urban areas.

Imports of live birds amounted to 15,601 in 1931, compared with 15,122 in 1930, while exports were 15,044 in 1931 and 9,227 in 1930.

The total number of farmers reporting poultry is 2,230, and of this total 1,117 reported sales of eggs, while 332 had sales of 500 dozen and over.

Eggs.—The total sales of eggs by farmers show a considerable increase in this branch of farming, the total reported amounting to 845,640 dozen, as compared with 725,964 dozen in 1930. Imports of eggs amounted to 155,649 dozen, valued at £10,261, compared with 113,194 dozen, valued at £8,499 in 1930. Exports of eggs increased from 368,723 dozen in 1930 to 384,052 dozen in 1931.

(b) CROPS GROWN BY EUROPEAN FARMERS.

During the season under review there was a deficiency of rain in most districts during the planting and growing periods, which affected crops to their disadvantage.

The parasite witch weed appears to be spreading and has become a menace in some areas.

The outstanding features are:—

(1) The continued decrease in the acreage planted to maize, combined with a decreased yield per acre;

(2) increase in the acreage planted to tobacco;

(3) increase in land planted for green manuring, the acreage under which has nearly doubled itself again;

(4) increased acreage planted to subsidiary crops, notably leguminous crops.

Area under Cultivation.—The total area under summer crops during the season under review was 403,195 acres, as compared with 417,984 acres in 1929-30. The decrease is mainly accounted for by the smaller acreage planted to maize.

Green Manuring.—One of the most striking features of the year is the large increase in the acreage planted to green manure crops, and it is apparent that the benefits accruing from this form of soil enrichment are at last being realised.

The increase in the total leguminous crops is indicated by the following figures:—1927, 4,074; 1928, 4,972; 1929, 11,427; 1930, 19,791; 1931, 34,948.

Summer Crops.—*Maize.*—The total maize harvest was 1,436,644 bags from 273,372 acres, a decrease of 44,316 acres and 480,608 bags, compared with the previous year. 40.4 per cent. of the total crop was grown in the Mazoe area, 15.3 per cent. in the Salisbury area and 12.6 per cent. in the Lomagundi area.

Number of Maize Growers.—An analysis of the returns dealt with shows that 2,238 farmers out of a total of 3,100 grew maize, or a percentage of 72.2 per cent. compared with 76.1 per cent. in 1929-30.

Maize Graded for Export.—The amount of the 1930-1931 crop graded during the current season was 663,592 bags, as compared with 872,441 bags (1929-30 crop) graded during the previous season.

Ground Nuts.—There has been a slight increase in the land planted to this crop, but the yield per acre which showed a tendency to improve in 1929-30 has again dropped to eight bags or about half the acre yield obtained in the main ground nut producing countries.

Maize Silage.—This valuable fodder crop continues to occupy the premier position amongst crops grown for this purpose. The total acreage reported was 13,603 acres, compared with 11,101 acres in 1929-30. The yield of 35,223 tons or 2.6 tons per acre is slightly less than that obtained in the previous season, when the acre yield was 2.9 tons.

In addition to the maize grown specially for this purpose, a large tonnage is reaped from land planted for purposes of

grain, mainly by cutting the tops. During the year 7,192 tons were obtained from this source, compared with 7,437 tons in 1929-30.

The total maize silage produced amounts, therefore, to 42,415 tons, compared with 40,565 tons in the previous season.

Veld Hay.—In addition to the crops specially grown for fodder purposes, considerable quantities of veld hay are cut each year. During the year under review 45,860 tons were stated to have been cut by farmers, an increase of 4,071 tons on that cut in 1929-30.

Cotton.—A total area of 8,979 acres was planted to this crop and the yield amounted to 2,606,890 lbs of seed cotton, or 290.3 lbs per acre.

Tobacco.—With the improvement in the market there has been an increase in the land planted to this crop.

The total area planted in 1930-31 amounted to 16,145 acres, of which 15,317 acres grew the Virginian type and 828 acres the Turkish variety.

The total production amounted to 8,644,390 lbs., of which 8,268,926 lbs. was Virginian, etc., leaf, and 375,464 lbs. Turkish leaf; the greater bulk is stated to be flue-cured. There was a considerable increase in the amount of fire-cured tobacco, but the production of Inyorka and kaffir tobacco was reduced.

Tea and Coffee.—These two crops are making steady progress, though both industries are in their infancy.

During the 1927-28 season the total yield of tea was estimated as 5 lbs. and of coffee probably about 400 lbs. During the season under review 3,860 lbs of tea were produced and 5,500 lbs of coffee.

Winter Crops.—The total area in Southern Rhodesia devoted to the raising of winter crops is still comparatively small, amounting to 13,896 acres, which, however, is an increase of 2,182 acres, or 19 per cent. on the area planted in 1930. The increase is mainly in land planted to wheat, which in 1931 amounted to 8,631 acres, or 62 per cent, of the total acreage under winter crops during the year. Owing to the absence of rain during the growing period these crops

are grown either under irrigation or on the moisture-retaining vleis situated principally on the sand veld. As wheat is principally grown under the latter conditions, it would appear that the employment of irrigation for producing crops during the winter months is not being developed to any great extent.

The total number of farmers who are engaged in growing winter crops is only 755, or 24 per cent. of the farmers in the Colony. Taking 10 acres as the minimum for a farmer who may legitimately be considered as a producer of winter crops, only 322, or 10 per cent. of farmers came within this category. Nearly 50 per cent. of these are in the districts of Charter, Salisbury and Melsetter, these districts also accounting for 47 per cent. of the total acreage under winter crops.

Potatoes.—The total area planted to winter potatoes was 1,152 acres, compared with 871 acres in 1930.

The summer crop yielded 29.4 bags per acre, which is the highest yield on record, and the winter crop 26.7 bags, compared with corresponding acre yields of 26.1 bags and 20.5 bags in 1930.

Onions.—Only small acreages of this crop are grown. The area devoted to onions in the year under review was only 97 acres, which yielded 3,441 bags.

Wheat.—The total acreage planted to this crop was 8,631 acres compared with 6,911 in 1930, the yield per acre being 2.3 bags.

During the last five years the Rhodesian wheat crop bas only averaged 14 per cent. of the total consumption in the Colony.

Oats.—The total acreage planted to this cereal was 2,121 acres compared with 2,193 acres in 1930.

Barley.—The total acreage planted to barley was 1,778 acres, and this showed an increase of 300 acres.

Rye.—Small acreages only are grown; during the season under review 87 acres were planted and 66 bags of grain were reaped from 52 acres, and 39 tons of fodder from 35 acres.

Fruit.—The total number of bearing fruit trees has shown a considerable increase during recent years. During

the season under review it is estimated that 64,743 deciduous fruit trees and 159,424 citrus trees were in bearing in the Colony.

Forestry.—Afforestation has during the year under review received increased attention, the total area reported being 18,167 acres, compared with 17,858 acres in 1929-30.

The main increases were in the Umtali, Chilimanzi, Salisbury and Marandellas districts. The two former districts increased from 987 acres and 413 acres respectively in 1926 to 5,142 and 1,845 acres in 1931. In both these districts there are large Government afforestation schemes, the Stapleford Forest Reserve being in the Umtali district and the Mtao Forest Reserve in Chilimanzi. Salisbury increased its acreage from 960 acres to 2,529 acres during the same period and that of Marandellas rose from 1,338 acres to 2,903 acres.

Tel/T/1891/32

FARMERS
and Others

Who wish to obtain Customers

for their products and goods should consider advertising in the **TELEPHONE DIRECTORY, 1933,** which will again include a limited number of half-page and quarter-page advertisements.

The DIRECTORIES will be issued gratis to all Telephone Subscribers in Southern Rhodesia, of whom there are over 4,000.

Rates and conditions will be supplied upon application to the Secretary, General Post Office, Salisbury.

FARMING CALENDAR.

October.

BEE-KEEPING.

Bush bloom is now on, the queens consequently are laying vigorously, therefore give space and ventilation. In good districts, where stocks are strong, nectar may be coming in freely, and to prevent swarming it may be necessary to remove a crate of honey. By using the carbolic cloth, the operation is easily and quickly accomplished. At this season, whenever a crate of honey is removed, a properly fitted empty crate must take its place, otherwise the bees will swarm. Keep the apiary clear of weeds, and all hives well shaded. Feed any weak stocks.

CITRUS FRUITS.

Citrus trees should not be permitted to suffer for want of water if a good setting of fruit is desired. Continue irrigation at fairly frequent intervals, especially if it is windy. Cultivation must follow each irrigation when the soil is fit to work, otherwise a large amount of moisture will be lost by evaporation. The packing of late fruit for export should be completed early in the month or before the rains commence. If rains intervene, the carrying properties will be affected and the fruit will probably break down in transit. Suppress all stem growths or water shoots as they appear. Young trees planted last season may with advantage have the stems whitewashed or washed with Bordeaux mixture paste; this will prevent undue sun-scalding of the unprotected stems. Plant cover crops with the first good rains.

CROPS.

If not already attended to, overhaul all farming implements and replace worn parts to ensure efficiency. Shell ground nuts required for the season's planting. Ploughing of old lands should, at latest, be finished this month. If seed potatoes will not keep in good condition until next month, they may be planted now, but later planting is better. Edible canna may be planted this month before rain falls. Also velvet beans, dolichos beans and sunn hemp towards the end of the month for green manuring. Harvest winter cereals and plough under the stubbles as soon as possible after harvest. When rains have fallen, use every effort to improve the tilth of the lands which will be the first to be planted. On cloddy lands already ploughed, seize the opportunity to break down the clods by disc and drag harrowing as showers of rain fall. A spiked roller is very useful for this work. A good tilth means good planting, and a good stand of maize; therefore, do everything possible by cross ploughing, disc and drag harrowing to bring the soil into good condition for seeding.

When necessary, keep the harrows going to check early weed growth. Clean lands at this time of year are an insurance against cutworm and other insect pests. If weather conditions permit, plant a trap crop of maize to attract the stalk borer. New land to be ploughed and intended for planting this season should be cleared of heavy grass or weeds by burning or cutting to ensure good work being done by the ploughs. Seasonal showers of rain are liable to spoil bricks unburned. See that bricks which have been made are protected from rain. Clean out guttering

and down-spouts of house and farm buildings. Press on with development work so as to have this completed before rains break.

DAIRYING.

During the month of October and until such time as the rains have commenced and green grazing is available, dairy stock require to be almost entirely stall fed. Cows in milk and cows due to calve should be liberally fed on succulents and concentrates in order that they may commence the dairying season in good condition, and make full use of the early grazing for milk production. Dairy cows that are underfed at this time of the year invariably produce milk of poor quality, and usually throw weedy undersized calves; furthermore, they do not pick up in condition until comparatively late in the season.

During October, the cow's ration should consist of succulents such as silage or green feed, etc., legume hay of good quality and a liberal allowance of concentrates; a pound or so of a feed such as ground-nut cake is invaluable for dairy stock at this time of the year.

Weather conditions are generally fairly warm during the month of October, and every precaution should be taken to keep the cream, which is used for butter-making or which is sent to the creamery, as cool as possible. The can or bucket containing the cream should be placed in a basin of water or concrete trough, in the dairy, and exposed to a draught; a piece of kaffir blanket, which dips into the water, should be wrapped around the can or bucket containing the cream. Churning of cream for butter-making is best carried out early in the morning—before sunrise if possible; the coolest water obtainable should be used for washing the butter whilst in the granular stage.

At this season of the year cheese-makers may find that the milk is deficient in butter fat; this is generally the result of under-feeding or unsuitable feeding. Cheese made from milk of low fat content is invariably dry and hard, defects that are accentuated by over cooking the curd or by cooking at too high a temperature. The curd should be firmed in the whey at a temperature not higher than 98° F. to 100° F.

DECIDUOUS FRUITS.

Keep all trees well watered until the rains commence; cultivate after each watering to prevent evaporation of added moisture. Rub off all undesirable shoots, such as those arising on the main stem near the ground; also those shoots having a tendency to crowd each other. Two or more shoots should not be allowed to develop from the same spot on any part of the tree. Rub off the weaker ones soon after they appear. The fruit of early peach trees should be thinned out if a heavy crop has set; this thinning will result in a crop of large-sized fruit. All fruit should be thinned out if necessary.

ENTOMOLOGICAL.

Maize.—Where circumstances permit early growth of maize, crops planted late in October are liable to suffer in December from stalk-borer, especially if only a few acres are involved. If maize can be planted early in October, the plants are usually large enough by December to outgrow serious damage. Maize beetle is now in its pupal stage. Thorough working and smashing up of the soil at this time will destroy great numbers.

Tobacco.—See notes for last month, together with article in the "Rhodesia Agricultural Journal" for October, 1926, on "Baiting of Tobacco Seed Beds with Cyanogas Calcium Cyanide." The lands must be kept free from all weeds which caterpillars may feed on, and it is well not to have maize, tomato and Cape gooseberries near the lands; a clearing of some depth is advisable, which must be regularly weeded. If poisoned bait is put down, it has been found that a covering of sacking or leaves will help to retain moisture and thus give further attraction,

especially at this time of the year. In order to lessen the heavy infestation of caterpillars and other insect pests in the seed beds, coverings of bessian or cheese cloth should be kept over beds, especially at night; cutworm moths are nocturnal in habit, so that the coverings of the beds need to be moth-proof at night. Notwithstanding precautions in the covering of the beds, insects will enter, and after the emergence of the seedlings a weekly spraying should be carried out. Lead arsenate at the rate of 1½ ozs. (powder) or 3 ozs. (paste) in a 4-gallon petrol tin can be sprayed on the plants once a week to keep insect pests in check. Lead arsenate can be safely used with Bordeaux mixtnre, the constituents not reacting upon one another. The two combined sprays act as a preventative and deterrent to insect and fungoid troubles.

Cotton.—Thorough cnltivation and keeping down of weeds should be resorted to in order to lessen the infestation of over-wintering pupæ, by exposure to the sun, and birds.

Potato.—Avoid introducing root gallworm and potato diseases to valuable land under irrigation or to the home garden with seed potatoes. Growing plants in October may be defoliated by caterpillars, or the tops severely injured by the potato tuber moth. Spray with arsenate of lead (powder), 1 lb. to 30 gallons of water; or (paste), 1 lb. to 16 gallons of water.

Cabbage, Turnip, etc., are apt to suffer severely from diamond back moth and webworm. Dust regularly with Paris green, 1 lb.; fresh water-slaked lime, 20 lbs. For cabbage aphis, water liberally, and wash plants regularly with a forceful stream of water from a hose or spray pump.

Beans and Peas are little attacked by insects at this time of year. If aphis (green fly) is troublesome, the plants may be sprayed with soap wash or tobacco wash. Leaf-eating beetles are best destroyed by hand.

Cucumbers, Marrows, etc., may be attacked by leaf-eating beetles, *which quickly destroy the young plants. The young plants may be protected* by gauze covers. Once vigorous growth has started, the damage is negligible.

Citrus.—All out-of-season fruit should be removed by this time. Destroy all fruit "struck" by the false codling moth. Aphis may be controlled by very careful spraying with the combined "Lime-Sulphur-Nicotine" spray (for details see "Rhodesia Agricultural Journal," Sept., 1926, page 871), while the yellow thrip may also be kept in check by this spray. Avoid using miscible oils for citrus spraying. A careful search should be made for the American bollworm ("Heliothis obsoleta").

Deciduous Fruit Trees, including grape vines, are liable to attack by chafer beetles. Heavy spraying with lead arsenate (paste), 1 lb. to 10 gallons of water, or (powder), 1 lb. to 20 gallons, appears to afford considerable protection, but the leaves need thoroughly coating.

Fig.—Fruit infested with fig weevil should be collected regularly and destroyed.

FLOWER GARDEN.

All flower seeds, annual and perennial, may be sown as in September. A word or two on open seed beds may not be out of place here. These beds should be prepared in a sheltered position, and the soil should be well and deeply dug. This is most essential, as in this state the soil when once watered is more easily kept moist, and is not so liable to cake. The top dressing should be free from all undecayed vegetable matter, and when sown, the seeds should be covered with a thin dressing of fine light soil, over which a thin covering of grass may be placed to check evaporation. Transplanting from boxes or beds should be done on a dull day or towards evening; the plants should be well watered before being removed, and the roots disturbed as little as possible, care being taken that the latter have their full depth and spread when planting.

VEGETABLE GARDEN.

As in September, nearly all vegetable seeds may be sown. Early potatoes should be earthed up when reaching the height of about eight inches. In planting a small amount of marrow, melon, cucumber, and pumpkin, the writer has found it economical to sow the seed one in a tin and transplant when about four inches high in hills. A few cucumbers planted in this manner yielded nearly 400 a week for about two months. Sweet corn and maize may also be sown this month.

FORESTRY.

The main sowings of Eucalypt (gum) seed should be made either in seed trays or in well prepared seed beds. A well-broken soil forming a fine tilth in the seed bed ensures more successful germination and better plants. If transplants are being used, any seedlings which are ready should be pricked out.

Seedlings in open beds may have their tap roots cut so as to develop fibrous lateral roots, and thus produce good type stocky plants. Remember the plant feeds through its roots, hence the better the root system, the healthier the plant and the greater its chances of successful establishment. If conditions are favourable, cross-plough and harrow land for planting broken up in early autumn.

POULTRY.

October is usually a hot month, and poultry keepers should therefore see that their birds have access to shade during the day. At the same time they should have plenty of air. One often sees birds during hot weather sitting under dense bushes, which is almost worse than no shade at all.

All houses should be examined and, if necessary, repaired. It is advisable to repeat the caution that birds must have dry quarters.

Many poultry keepers do not realise the vital necessity of giving their birds especially the young stock, plenty of succulent green food during the hot weather. It should be cut up and placed in boxes or hoppers about 7.30 a.m. and 5 p.m., and, if very hot, also at noon; it should never be placed in the sun. As much as the birds will eat should be supplied. Lack of it, especially during hot weather, causes a reduced output of eggs, smaller eggs and light-coloured yolks; further, a disease known as "nutritional disease" is likely to affect the birds and cause deaths. The symptoms are much like those of eye roup, without the well-known offensive smell of roup. It is due to the fact that vitamine A, which is present in large amounts in all succulent green foods, and which is so necessary for nutrition, is lacking. There is no doubt that many chickens and fowls die each year from this cause.

Ducks.—These during the hot weather require even more shade than do fowls; they cannot stand the direct rays of the sun nor sultry heat. The houses should always have dry floors, and should be overhauled before the rains commence. Ducks sleeping on damp floors often contract rheumatism and cramp. The floor of the duck house should be raised a few inches, thus ensuring a dry bed.

As many ducklings should be hatched as possible now, provided, of course, there is the prospect of a sale for them at ten weeks old. They thrive best in the wet weather.

Turkeys.—Stop hatching until after the wet season is over. To rear turkeys in the wet weather entails a good deal of time, labour, expense and often losses. Once a young turkey chick gets wet, it will probably die; at any rate it will never be the same bird it would have been had it not got wet. Give the older turkeys all the range possible; the further afield they go, the better grown birds they become, and less is the expense of feeding. See also that their roosting quarters are water-tight before the rains commence.

STOCK.

Cattle.—Ranching cattle on granite veld will in many instances be in fairly good condition on account of the early grass in the vleis, etc. On the diorite soils and later veld the cattle owner will still have to watch his weaker cattle carefully. In any case all supplies of hay, ensilage, majordas, etc., should be carefully husbanded in anticipation of possible late rains, but at the same time every effort should be made to prevent cattle becoming weak. Dairymen will need to feed highly both with succulents and green foods. Calves should be weaned and branded if this has not already been done, and care should be taken that they do not suffer any serious setback by reason of want of feed. The question of a mineral mixture should receive consideration.

Sheep.—If spring lambs are expected, one should see that the sheep-shed is in order, and that there is a supply of hay, ensilage or mealies for the poorer ewes in the event of late rains. All drinking places should be cleaned out, and care taken that the water supply is sufficient. Ewes for winter lambing should be well looked after, so as to get them up in condition before they are put to the ram next month. General shearing may start, including the April-May lambs.

TOBACCO.

Continue to sow seed beds. Where grass has been put on the seed beds to assist germination of seed a daily inspection should be made, and as soon as the first few plants make their appearance the grass should be raised up a little from the bed in order to prevent the plants growing "spindley." All possible preparation for the coming planting season should be made.

VETERINARY.

White scour is prevalent in spring—November and December—but dipping is eradicating this disease. There is still danger from vegetable poisoning, and it will only disappear when there is plenty of good grass on the veld.

WEATHER.

This is apt to be a hot, dry month, and rather trying, therefore, to man and beast, and the strong winds which blow at this season add to the general discomfort. Evaporation is, as a consequence, at its greatest at this time of year, and dams and pools lose most from this cause. The prevalence of veld fires at this time of year adds to the anxiety of the stock owner.

The rainy season has occasionally started early in October, but for practical purposes it need not be expected before the end of this month. The days are becoming warmer, and often even hot and oppressive. Clouds gradually collect, at first disappearing at sunset, but later becoming more persistent. Sheet lightning is usually frequent, and showers of gradually increasing severity mark that the rainy season has set in. Steps should be taken in advance to provide for the run-off after such torrential rains, otherwise serious loss may result.

The normal rainfall varies from three-quarters of an inch to an inch in the different portions of the country. The rain usually occurs in the form of thunder-showers, which are not long sustained and are fairly local, but the total rainfall experienced during the month does not vary much over the whole country, with the exception of the eastern border, where the rainfall is usually heavier.

November.

BEE-KEEPING.

Now that the first honey flow is on, be sure the hives stand level, whether working them for extracted or section honey. This is important, saving annoyance when preparing the product for market. Occasionally, where bees have not been thoroughly subdued, they object to the removal of honey; postpone the operation for 24 hours. Where increase of stocks is required, artificial swarms can now be made. Use care in storing honey.

CITRUS FRUITS.

If no appreciable rain has fallen, irrigation must be resorted to in order to keep the trees in good growth and to prevent any check to fruit development. This is a good month to plant green crops. Sunn hemp is possibly the best crop to smother weed growth and supply humus-forming material after it is ploughed in. If not already done, storm drains should be made on the sloping ground to prevent erosion of the surface soil during heavy storms. Where new plantings are contemplated, the holes should be dug and everything got in readiness for planting if the trees are ready for lifting in the nurseries. All unthrifty trees could with advantage have an additional amount of fertiliser and manure applied during the month. Keep down all water shoots.

CROPS.

Take note when the first rains fall, and see what leaks there are, if any, in the farm buildings. Do not neglect to effect such repairs as are necessary. Early in the month see that the planters are in perfect order, and that they drop the different seeds to be planted evenly and at the right distance. Try them out on the farm road. Hasten the work of getting the lands for early sown crops into as good a condition for seeding as possible, so that the first and most favourable opportunity for planting may be seized. The young plants make more rapid growth in a good seed bed. Utilise exceptionally early rains for this purpose rather than for planting. The holes for check-row planting of maize can continue to be prepared until sufficient rain has fallen to allow of planting. Velvet beans and dolichos beans for seed or hay may be planted dry if the land is in good order. With favourable weather, planting of maize, velvet and dolichos beans and cotton will commence about the middle of the month, and will continue as the condition of the land and the rainfall permit. *Main crop potatoes should be planted from now on to* January. Dhal may be planted for seed or green manuring—if for seed, a frost free situation is necessary. Kaffir corn for seed may be planted this month. Green-manure crops requiring a long growing season should be planted. Destroy, by feeding or burning, early planted trap crop of maize or volunteer plants which have become infested with stalk-borer.

If weeds are beginning to show, keep the harrows going in front of the planters. If weeds are too advanced to be killed by drag harrows and too numerous to be dealt with by hand labour, use the disc harrow or lightly re-plough the land. If the tilth is good, do not be afraid to harrow the young maize. This will save much labour later on by destroying the weeds while they are small.

DAIRYING.

In a normal year veld grazing should be plentiful in November, and the feeding of dairy stock is then very much simplified; veld grass in a green and succulent condition is practically all that is required for animals of less than average production. Heavy milking cows, however, on early pasture, require extra feed in the form of concentrates, while the latter should always be fed to dairy stock which are in poor condition

at this time of the year. Young calves should not be turned out to graze with the herd, and in wet weather are best kept in a clean, dry, airy pen. Weaned stock, which have not hitherto had access to green pasture, should be gradually accustomed to the change in diet and may at first be turned out to graze for short periods. Young stock on pasture should also receive a small daily allowance of concentrates.

Farmers supplying cream to the creamery should adjust the cream screw to the separator so that the latter will separate a cream testing 45 to 50 per cent. butter fat. Cream of this consistency will keep better than thinner cream. It should be borne in mind that it is practically impossible to produce first-grade cream if the cattle are milked in a muddy kraal. In the absence of a cow shed, every endeavour should be made to erect a small milking shed in which four or five cows can be tied, milked and fed. A small shed of this kind is also essential to obtain clean milk for cheese-making. Milking in a muddy kraal invariably results in a gassy, bitter cheese being produced.

The shelves of the cheese room should be scrubbed with boiling water and soda, and for the last rinsing a weak solution of formalin may be used. This should prove effective in controlling cheese pests.

DECIDUOUS FRUITS.

Continue thinning out fruit on the trees if a very heavy setting has occurred. A small amount of large-sized fruit is preferable to a large crop of small fruit. Thin down the inner growth of new shoots if they have a tendency to crowd each other, and stop all suckers and main stem growths as they appear.

ENTOMOLOGICAL.

Maize.—Crops planted before the last week in this month are liable to suffer later from stalk borer. At Salisbury, crops planted after 27th November have escaped serious injury, but early December plantings are probably the safest. Volunteer maize is commonly badly infested and should be cut out and removed immediately, otherwise the borers tend to spread to surrounding plants. If rain has fallen sufficiently early, lands may be baited at the end of the month against surface beetles, snout beetles and other pests which tend to reduce the primary stand of plants. The formula is arsenite of soda 1 lb., cheapest sugar 8 lbs., or molasses 1 gallon, water 10 gallons. Dip chopped Napier fodder or other green stuff and distribute broadcast. The poison may be sprayed over volunteer maize and weeds on land with good effect. Cutworms do not usually appear in numbers until December, except in low-lying land. Succulent green stuff soaked in a 2 per cent. solution of sodium fluoride is the most recent formula for poisoned bait, but destruction of these pests is difficult. Keep the land clear of weeds as a preventive measure. If the young plants are attacked by the black maize beetle (heteronychus), the only remedy is to destroy by hand. Good, clean farming will control these pests to a large extent.

Tobacco.—This crop is subject to many pests in its early stages, although attacked by a few after vigorous growth has started. Keep cheese cloth covers on seed beds at night to exclude pests, and spray regularly with arsenate of lead (powder) 1 lb. in 30 gallons of water to protect against leaf-eating insects, etc. Lands may be baited against surface beetles with maize bran moistened with arsenate of soda 1 lb. in 30 gallons of water. Distribute in balls about the size of a golf ball and cover over with branches or anything to protect from sun. Place one ball to each ten plants and moisten again when dry.

Potato.—The first brood of leaf-eating ladybirds appear in November. Spray with arsenate of lead (powder) 1 lb. in 30 gallons of water. Spraying is also useful against the black blister beetles, which sometimes attack the crop on sandy soils. Keep the soil of irrigated crops well hilled and in friable condition as a precaution against tuber moth laying eggs on the tubers.

Kitchen Garden.—Plants of the cabbage family are liable to attack by diamond-back moth and other leaf-eating insects. When considered desirable, *young plants may be dusted lightly with arsenate of lead* (powder). Cabbage aphis may be kept in check by liberal watering and frequent washing with a forceful stream of water from a hose pipe or spray pump. Drenching the plants regularly with cold water is also held to be a good remedy for the diamond-back moth mentioned above.

Deciduous Fruits.—Young trees may need spraying with arsenate of lead (powder) 1 lb. in 20 gallons of water as a protection against chafer beetles, whose attack may check the growth very seriously. Choice varieties of early peaches may be netted to protect them from fruit-piercing moths.

When in doubt as to the identity of any pest or the method of dealing with it, apply promptly to the Chief Entomologist, Salisbury, bringing or sending specimens of the insects concerned. Note, however, that it is sometimes feasible to prevent injury from pests for which no practical remedy is known. Farmers should therefore endeavour to obtain some knowledge of the pests of the crops they are growing through the articles published in this Journal.

FLOWER GARDEN.

All seeds may now be planted. Annuals for January flowering should be sown, amongst which the following will be found to do excellently in this Colony:—Balsam, Calliopsis, Centurias, Chrysanthemum, Dianthus, Escholtzia, Marigold, Mignonette, Gallardia, Phlox, Poppy, Nasturtium, Nigella, Verbena and Zinnia. These are all hardy, and may be sown in the open either in beds or in the position desired for flowering. Advantage should be taken of each shower of rain during this month to keep the soil well worked and loose.

VEGETABLE GARDEN.

All vegetable seeds may be sown during this month. Tomatoes and early peas and beans should be staked. The soil should be kept loose and *free from weeds, which now get troublesome. Sow pumpkin, mealies, peas* and potatoes.

FORESTRY.

Sowings of eucalypt (gum) seed should be made for late planting. If fresh seed of cedrela toona is available, sowings should be made. Keep the seed beds moist and free from weeds. The tap roots of early seedlings may be cut back in order to form hardy, stocky plants most suited for planting. Continue with pricking out if transplants are to be used.. Prepare all land to be planted by cross-ploughing and harrowing. A well prepared soil is a good fertiliser; it assists establishment and reduces failures

POULTRY.

Some birds will now be commencing to moult. This will cause a decrease in the number of eggs laid. The poultry keeper, therefore, should see that his birds come through the moult as quickly as possible. Some birds will lay and moult simultaneously, but these are the strongest, most vigorous and the best layers; the majority do not. The process of moulting is a natural one, but it is a severe strain on the system. Fowls that are not too fat, and can stand extra feed at the commencement of the moult, come through it best. More green and animal food should be given, and the utmost care taken that they are not exposed to cold or wet, otherwise they will not only take longer to moult, but go off in condition. A little linseed stewed, or linseed meal, or ground nut meal and milk should also be given. There will next month be a demand for table birds, and such as the poultry keeper intends to sell should be selected. In making this selection, it is no use choosing old or scraggy birds, for it is hopeless to attempt to fatten these, or make them good table birds. Do not coop them up till a fortnight or so before they are to be sold; give them free range and feed them well, with at least one feed of soft food mixed with milk once a day.

Turkeys destined for the Christmas market should have free range, but also a feed of soft food once a day, and a good feed of mealies in the evening.

STOCK.

Cattle.—Normally rains should have fallen and the veld should be plentiful now. Beyond careful dipping, ranchers should not have much worry. If the season is bad, the poorer cattle should be drafted out and given a little hay, ensilage or maize daily. The grazing should be improving rapidly in feeding value. If normal rains have fallen, the grass should be sufficient for cows of average production. Heavier milkers should be fed concentrates at the rate of about 3 lbs. per gallon of milk produced over the first. In most cases maize meal alone will be sufficient for the purpose.

Sheep.—Dip sheep; put the rams to the ewes; keep the sheep on high dry land; be sure the kraal or sheep shed is dry and clean, and that there is shelter from the rain for young lambs.

TOBACCO.

Continue to sow seed beds, watering, etc. When early beds become overgrown and hard, pull out, dig up and re-sow. Begin transplanting with the first good rains, and continue as fast as the rains and planters will allow, until the crop is set out. Be careful to fill in the misses from previous transplanting before starting on new fields; use the stoutest and best plants for filling in, and try to get the tobacco from any one field to grow and come to maturity as near at the same time as possible. Discontinue filling in when the field has been planted for several weeks and has made a good start to grow, as the later filled in plants will be choked out by the earlier ones, and will not come to maturity. Cultivate fields as soon as plants are established, to keep down weeds.

VETERINARY.

Early heavy rains might bring on horse-sickness before its usual time, but as a rule it need not be feared till the first rains are over in December.

WEATHER.

The rains should be commencing, if not already begun; occasionally they have delayed until December, and even later, before setting in properly. Between spells of wet weather lasting several days, fine dry periods occur, at first clear, but later cloudy and thundery, gradually gathering to burst in thunderstorms. The mornings are generally fine, and rain falls chiefly in the afternoon or evening. Heavy downpours are to be expected, and should be provided against beforehand by means of ditches and embankments, and by clearing water ways and furrows. In a normal season the rainfall varies from two-and-a-half to three inches in Matabeleland, and from three-and-a-half to four inches in Mashonaland generally, with the exception of the eastern border, where it amounts to five inches. Between the rain periods and prior to the commencement of the rains, severe heat is likely to be experienced.

SOUTHERN RHODESIA VETERINARY REPORT.

July, 1932.

AFRICAN COAST FEVER.

MELSETTER DISTRICT.

Rocklands Estate.—The process of removing the infected herds through temperature camps was continued. The mortality from coast fever during the month was 113 head.

Laughing Waters.—The infected herd was moved to a further temperature camp on clean veld. Mortality during the month, three head.

Orange Grove.—The temperaturing of the infected herd, which was removed to Welgelegen, was completed. No cases of coast fever occurred.

No fresh developments at the other infected centres.

FOOT AND MOUTH DISEASE.

GWELO VETERINARY DISTRICT.

Three fresh outbreaks occurred, viz.: (1) On West Gwelo Block adjoining the previously infected Aberfoyle Block; (2) on farm De Rust adjoining the infected farm Pender; and (3) on farm Sonambula No. 2, west of the railway line. Concentration of infected and adjoining herds was carried out where possible, and all cattle involved were inoculated.

UMVUMA VETERINARY DISTRICT.

No fresh outbreaks. The inoculation of the Central Estates cattle, over 31,000 head, was completed on 29th July.

VICTORIA VETERINARY DISTRICT.

This area is now regarded as free from disease.

BULAWAYO VETERINARY DISTRICT.

Insiza District.—Infection was found amongst some herds in the Mbondu dipping tank area adjoining the infected

Siwazi area. All the cattle directly and indirectly involved—upwards of 8,000 head—were concentrated for inoculation, leaving a cattle free belt of ten miles wide on the northern side. On the western side cattle free belts and strong cordons have been established and to the east all cattle have passed through the disease. Inoculation was completed on the 28th July.

No further infection occurred in the Virgina area and the inoculated cattle were returned to their respective kraals.

Gwanda District.—Infection extended from the Donkerhoek inoculation camp to the farm Sherborne, a sub-division of the eastern section of Olympus Block. This area lies immediately to the south of the infected areas in Insiza district. In order to prevent the spread of infection a cattle free belt of five miles was established on the western bank of the Umzingwane River by moving the cattle thereon to the eastern section of Olympus, and by moving all cattle south of Olympus Block to a point five miles further south. This effects a cattle free belt west of the Umzingwane River five miles wide from the south-western beacon of Glass Block to a point five miles south of Olympus Block. All cattle involved in this outbreak were inoculated.

TRYPANOSOMIASIS.

Mortality from this disease occurred on four farms on the Eastern Border, Melsetter district, and also on several farms in the Darwin district.

HORSESICKNESS.

One case in the Melsetter district and one at Inyati.

IMPORTATIONS.

From the Union of South Africa and Bechuanaland Protectorate: Bulls 3, heifers 30, oxen 51, cows and calves 319, horses 30, donkeys 7, sheep 1,033, goats 194.

EXPORTATIONS.

Nil.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

SOUTHERN RHODESIA WEATHER BUREAU.

AUGUST, 1932.

Pressure.—Mean barometric pressure for the month was well above normal except at Salisbury.

The usual winter anticyclone was established in the Transvaal from the 1st to the 8th; gradients were weak on the 9th and 10th and on the 11th, and a low appeared off the S.W. Cape and remained until the 14th, when a fast-moving high approached the W. coast. The high became established in the Transvaal on the 16th and 17th, but later extended up the coast to the north of Madagascar, and a second low appeared on the south coast. Surface winds were south-easterly and cold, but a strong northerly persisted in the upper air, and very unusual rains occurred in the north.

Temperature.—Mean monthly temperatures were generally below normal.

Rainfall.—Rain fell between the 18th and 21st in the north and west and at a number of stations the previous maximum for August was exceeded. Light showers of the guti type were recorded later in the month in the south and east.

AUGUST, 1932.

Station.	Pressure Millibars, 8.30 a.m.		Temperature in Stevenson Screen ° F.								Rel. Hum.	Dew Point	Cloud Amt.	Precipitation.			Altitude (Feet).
			Absolute.		Mean.												
	Mean.	Normal.	Max.	Min.	Max.	Min.	½ Max. Min.	Normal.	Dry Bulb.	Wet Bulb.	%	F.	0-10	Ins.	Normal.	No. of Days.	
Bulawayo ...	873.5	872.5	81	36	71.3	44.8	58.1	60.8	58.9	48.9	47	39	1.5	...	...	...	4,436
Gwelo	867.1	...	80	36	71.2	44.2	57.7	59.6	57.4	40.1	54	41	2.2	0.01	...	1	4,632
Riverbank ...	...	...	86	39	76.5	46.5	61.5	62.4	58.8	49.2	49	40	...	...	..	...	4,100
Essexvale ...	...	...	90	33	77.7	41.2	59.5	60.7	51.5	46.6	69	42	..	...	...	...	3,828
Gwanda ...	912.4	...	85	34	75.1	44.4	59.8	...	60.5	51.0	51	42	1.5	...	0.1	...	3,235
Mazenga ...	954.8	953.1	91	37	79.9	44.5	62.2	64.3	63.0	55.2	61	49	2.4	...	0.2	...	1,970
Nuanetsi ...	...	...	90	37	79.8	45.2	62.5	...	60.0	53.6	66	48	2.1	0.20	...	1	1,630
Between Rivers	...	...	85	33	76.6	42.2	59.4	...	57.2	50.2	61	44	0.9	0.70	0.1	2	3,970
Enkeldoorn ...	...	...	80	36	69.5	44.5	57.0	59.9	58.4	50.7	57	42	2.2	0.05	...	1	4,720
Gatooma ...	...	...	85	37	76.7	44.3	60.5	63.3	60.5	51.5	53	43	1.0	0.06	...	3	3,850
Miami	883.3	...	81	40	73.6	47.0	60.3	...	60.2	52.2	58	46	0.8	0.55	...	2	4,090
Salisbury ...	859.0	859.0	78	38	70.5	45.2	57.9	59.6	58.3	49.5	53	42	1.8	1.78	...	4	4,890
Sinoia, Citrus ...	...	...	85	36	76.5	42.8	59.7	..	58.3	50.8	59	44	0.6	0.48	...	3	3,800
Sipolilo... ...	...	...	80	40	72.9	49.0	61.0	...	60.9	51.8	53	44	1.3	0.64	...	1	3,900
Mtoko	...	...	80	41	70.9	48.2	59.6	...	58.3	51.4	62	46	1.3	0.18	0.1	1	4,210
Shamva ...	...	...	85	37	77.7	45.8	61.8	...	59.2	...	...	...	1.2	0.17	...	2	3,170
Angus Ranch ...	...	...	87	44	77.8	51.3	64.6	64.2	60.7	54.2	66	49	...	0.08	...	2	2,300
Craigendoran ...	...	...	88	36	78.5	48.1	63.3	...	65.2	56.0	56	49	...	0.03	0.1	1	3,430
New Year's Gift	...	...	86	46	75.9	50.9	63.4	...	59.8	53.5	66	48	...	0.09	0.1	2	2,700
Nyamasanga ...	...	...	76	35	68.0	42.7	55.4	...	57.8	50.4	59	44	...	0.17	...	4	5,680
Riverdene North	...	...	84	31	74.4	38.6	56.5	...	50.8	46.7	74	43	...	0.04	0.1	2	3,700
Stapleford ...	...	...	71	30	61.0	40.5	50.8	...	53.3	48.2	69	43	3.3	1.13	0.1	7	5,450
Umtali	898.2	897.5	82	40	71.5	47.9	59.7	61.4	61.1	53.5	61	48	3.2	0.20	0.2	4	3,677
Victoria ...	...	...	83	35	72.6	42.3	57.5	58.6	57.9	49.6	55	42	2.0	0.02	0.1	1	3,570
Melsetter ...	854.8	...	77	39	66.7	46.3	56.5	...	58.5	49.3	51	41	2.2	0.35	0.4	2	5,060
Mount Selinda	...	...	80	44	70.7	49.0	59.9	...	58.9	52.7	66	48	2.9	0.56	0.7	5	3,520
Manchester ...	...	...	75	37	63.4	43.2	53.3	...	47.3	45.3	86	44	...	0.47	...	4	...

SALES.

AGRICULTURAL EXPERIMENT STATION, SALISBURY.

Spineless Cactus Slabs (blades) Algerian variety, per 100 slabs, 7/6 Salisbury, or 12/6 delivered free by rail to purchaser's nearest station or siding in Southern Rhodesia. For amounts of 500 slabs or more a reduction of 2/6 per 100 will be made.

Stocks are limited and delivery cannot be undertaken after 15th November.

Kudzu Vine Crowns, per 100 crowns, 15/-, Salisbury, or 25 crowns, 7/6; 50 crowns, 15/- and 100 crowns, 22/6, delivered free to purchaser's nearest station or siding in Southern Rhodesia. Delivery during September and October for irrigated land, and in January for dry land. Owing to pressure of other operations, it is not possible to deliver Kudzu crowns during November and December.

Woolley Finger Grass: 10s. per bag of roots, delivered on rail nearest station or siding; supplies limited. Available January and February.

The prices quoted above do not include charges for road motor transport. Cheques should be made payable to the Department of Agriculture, and preliminary enquiries and subsequent orders should be addressed to the Chief, Division of Plant Industry, Department of Agriculture, Salisbury.

DEPARTMENTAL BULLETINS.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution at 3d. per copy. Application should be made to the Editor, Department of Agriculture, Salisbury, and remittances must accompany orders.

AGRICULTURE AND CROPS.

No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.

No. 374. Fibre Crops—Deccan Hemp (Hibiscus Cannabinus) and Sunn Hemp (Crotolaria Juncea), by J. A. T. Walters, B.A.

No. 429. Propagation of Kudzu Vine, by H. C. Arnold.

No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.

No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.

No. 545. *Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.*

No. 550. Onion Growing under Irrigation, by C. Mainwaring.

No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.

No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E, B.Sc., F.I.C.

No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.

No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.

No. 630. The Storage of Seed Potatoes, by H. C. Arnold.

No. 634. *Barley, by P. V. Samuels.*

No. 643. Noxious Weeds in Southern Rhodesia, by F. Eyles, Botanist.

No. 650. Coffee Culture in Southern Rhodesia, by G. W. Marshall, Horticulturist.

No. 651. Two Important Leguminous Crops: The Velvet Bean and Dolichos Bean, by C. Mainwaring, Agriculturist.

No. 657. Hay-making in Southern Rhodesia, by C. Mainwaring, Agriculturist.

No. 663. The Use of Fertilisers and Manures in Southern Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.

No. 672. *Hay-making in Rhodesia, by H. G. Mundy, Dip.Agric., F.L.S.*

No. 674. Top Dressing of Maize against Stalk Borer, by H. C. Arnold

No. 681. The Sunflower (Helianthus Annuus) (Revised), by S. D. Timson, M.C., Dip.Agric.

No. 694. The Edible Canna (Canna Edulis), by D. E. McLougblin.

No. 695. The Castor Oil Plant (Ricinus spp.), by S. D. Timson, M.C., Dip.Agric.

No. 697. Results of Analysis of Samples taken under the "Fertilisers, Farm Foods, Seeds and Pest Remedies Ordinance" during the year 1927-28.

No. 704. *The Importance of Research on Pasture Improvement in Southern* Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.

No. 705. Suggested Cropping Programmes for Farms on the Sand Veld, by D. E. McLoughlin, Assistant Agriculturist.

No. 706. A Farmers' Calendar of Crop Sowings, by C. Mainwaring, Agriculturist.

No. 709. Sand Veld Farming and its Possibilities, by E. D. Alvord, M.Sc. (Agr.).

No. 710. Monthly Reminders for the Farming Year, by the Division of the Chief Agriculturist.

No. 713. Ensilage, by J. A. T. Walters, B.A., Agriculturist.

No. 727. Farmyard Manure, by A. P. Taylor, M.A., B.Sc., Agricultural Chemist.

No. 732. Two Common Diseases of Potato Tubers in Rhodesia, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A.

No. 743. Sunn Hemp, by S. D. Timson, M.C., Dip.Agric.

No. 751. The Sweet Potato, by S. D. Timson, M.C., Dip.Agric. (Wye).

No. 757. Maize on the Sand Veld : Results at the Tobacco Experiment Station, Salisbury, by C. A. Kelsey-Harvey, Manager.

No. 758. Instructions for Taking Soil Samples. Issued by the Division of Chemistry.

No. 759. Witch Weed (Striga Lntea) : Methods of Control, by S. D. Timson, M.C., Dip.Agric. (Wye).

No. 762. The Value of Rock Phosphate and "Bone and Superphosphate" as Fertilisers for Maize Production, by A. D. Husband, Chief Chemist.

No. 768. The Ground Nut (Arachis hypogaea), by S. D. Timson, M.C., Dip.Agric. (Wye).

No. 775. Agricultural Costings at the Gwebi Farm, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist, and J. Hick, Accountant.

No. 776. Regulations Governing the Export of Maize and Maize Meal through the Port of Beira.

No. 781. Agricultural Costings at the Gwebi Farm—Maize and Green Manuring, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist, and J. Hick, Accountant.

No. 787. Agricultural Costings at the Gwebi Farm—Ground Nuts and Maize and Beans for Silage, by H. G. Mundy, Dip.Agric. (Wye), F.L.S., Chief Agriculturist.

No. 793. Agricultural Costings on the Gwebi Farm, by H. G. Mundy, Dip.Agric., Chief Agriculturist.

No. 797. Green Manuring: An Essential Practice in Rhodesian Farming, by H. G. Mundy, Dip.Agric. (Wye), F.L.S., Chief Agriculturist.

No. 802. Witch Weed, by S. D. Timson, M.C., Inter.B.Sc. (Agric.) Lond., Dip.Agric. (Wye), Assistant Agriculturist.

No. 807. Studies on the Improvement of Natural Veld Pastures: No. 2, by A. D. Husband, F.I.C., and A. P. Taylor, M.A., B.Sc., Chemistry Branch, Department of Agriculture.

No. 813. A Preliminary Note on Clovers in Southern Rhodesia, by S. D. Timson, M.C., Dip.Agric. (Wye), Assistant Agriculturist.

No. 815. New Strains of Oats for Southern Rhodesia, by H. C. Arnold, Manager, Agricultural Experiment Station, Salisbury.

No. 816. Preliminary List of the more Common Grasses of Southern Rhodesia, by Sydney M. Stent, Botanist for Pasture Research.

No. 820. The Great Economic Problem in Agriculture—No. 1, by J. R. McLoughlin, M.Sc. (Economics), Economic Adviser.

No. 822. Re-stacking of Maize rejected for Export on account of Excessive Moisture.

No. 823. The Law of Supply and Demand—No. 2, by J. R. McLoughlin, M.Sc. (Economics), Economic Adviser.

No. 826. Some Poisonous Plants of Southern Rhodesia, by Sydney M. Stent, Senior Botanist.

No. 831. Revised Notes on Cotton Growing in Southern Rhodesia, by G. S. Cameron.

No. 833. Subterreanean Clover on the Sand Veld as Feed for Poultry in the Winter, by S. D. Timson, M.C., Dip.Agric.(Wye).
No. 836. *The Potato, by S. D. Timson, M.C., Dip.Agric.(Wye).*
No. 837. Veld Grass Silage—A Feature in Rhodesian Pasture Management, by H. G. Mundy, Dip.Agric. (Wye), F.L.S., Chief, Division of Plant Industry.
No. 838. Witch Weed—Progress Report and a Warning, by S. D. Timson, M.C., Dip.Agric. (Wye), Assistant Agriculturist.
No. 841. Poisonous or Suspected Poisonous Plants of Southern Rhodesia: Tulp Poisoning of Cattle, by Sydney M. Stent, Senior Botanist, and D. A. Lawrence, B.V.Sc., Veterinary Research Officer.
No. 855. Pigeon-hole Method of Stacking Maize, by Division of Plant Industry.
No. 859. Twenty-one Years of Plant Introduction, by Major Mundy, Chief, Division of Plant Industry.

REPORTS ON CROP EXPERIMENTS.

No. 608. Annual Report of Experiments, 1924-25, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.
No. 631. Bulawayo Experiment Station: Annual Report for Year 1925-26, by H. W. Hilliard.
No. 649. Annual Report of Experiments, 1925-26, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Manager.
No. 675. Bulawayo Experiment Station—Annual Report for Year 1926-27, by D. E. McLoughlin.
No. 683. Annual Report of Experiments, 1926-27, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Station Manager.
No. 688. Report, 1923-24—1926-27, Gwelo Municipal Demonstration Stations, by D. E. McLoughlin.
No. 716. Report, 1927-28, Gwelo Municipality Demonstration Stations, by S. D. Timson, M.C., Dip.Agric.
No. 745. Salisbury Agricultural Experiment Station Annual Report, 1927-28, by H. C. Arnold.
No. 773. Bulawayo Mnnicipal Demonstration Station: Report for the Seasons 1927-28 and 1928-29, by D. E. McLoughlin, Assistant Agriculturist.
No. 789. Agricultural Experiment Station, Salisbury: Annual Report of Experiments, 1928-29, by H. C. Arnold, Manager.
No. 800. Bulawayo Municipal Experiment Station: Report for the Season 1929-30, by S. D. Timson, M.C., Dip.Agric. (Wye), Assistant Agriculturist.
No. 806. Gwelo Demonstration Farm, by the Chief Agriculturist.
No. 810. Gwelo Municipal Demonstration Station: Annual Report, 1929-30, by S. D. Timson, M.C., Inter.B.Sc. (Agric.) Lond., Dip.Agric. (Wye), Assistant Agriculturist.
No. 830. Salisbury Agricultural Experiment Station, Annual Report, 1929-30, by H. C. Arnold, Manager.
No. 842. Gwelo Municipal Demonstration Station: Annual Report, 1930-31, by D. E. McLoughlin, Assistant Agriculturist.
No. 851. Bulawayo Municipal Demonstration Station: Final Report, 1932, by D. E. McLaughlin, Assistant Agriculturist.

TOBACCO.

No. 605. Flue-curing Tobacco Barns, Bulking and Grading Sheds, by P. H. Haviland, B.Sc. (Eng.), Acting Government Irrigation Engineer.
No. 615. The Culture of Virginia Tobacco in Southern Rhodesia—Field Management, by D. D. Brown.
No. 641. The Handling, Grading and Baling of Cured Virginia Tobacco,

No. 644. Tobacco Baling Boxes, by B. G. Gundry, Irrigation Branch.

No. 653. The Care of Tobacco Seed Beds, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A. (Trinidad).

No. 661. Flue-curing Tobacco Barns, 12 ft. x 12 ft. x 16 ft., by B. G. Gundry.

No. 665. Tobacco Pests of Rhodesia, by Rupert W. Jack, F.E.S., Chief Entomologist.

No. 671. Wildfire and Angular Spot of Tobacco, by J. C. F. Hopkins, B.Sc., A.I.C.T.A.

No. 679. Tobacco Culture in Southern Rhodesia: The Harvesting and Curing of Virginia Tobacco, by D. D. Brown.

No. 715. Turkish Tobacco Culture in Southern Rhodesia, by D. D. Brown, Chief Tobacco Expert.

No. 728. Suggested Crop Rotations for Tobacco Growers, by D. D. Brown, Chief Tobacco Expert.

No. 734. Common Faults in Curing Virginia Bright Tobacco, by D. D. Brown, Tobacco and Cotton Expert.

No. 746. The Development of the Tobacco Industry in Southern Rhodesia. A Historical Survey, by D. D. Brown, Chief Tobacco Expert.

No. 748. Frog Eye Disease of Tobacco, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Chief Botanist and Mycologist.

No. 753. Leaf Spotting of Tobacco caused by Mosaic, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Chief Botanist and Mycologist.

No. 771. Dark Fire-cured Tobacco: Field Operations, by D. D. Brown, Chief Tobacco Expert.

No. 774. Dark Fire-cured Tobacco: Harvesting and Curing, by D. D. Brown, Chief Tobacco Expert.

No. 784. Field Control of Frenching in Tobacco, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Plant Pathologist.

No. 812. Selection of Tobacco Seed Plants, by H. F. Ellis, M.Sc., B.Sc. (Agr.), Tobacco Adviser.

No. 828. Seed-Beds, by D. D. Brown, Chief Tobacco and Cotton Expert.

No. 835. Tobacco Culture—Transplanting Operations, by D. D. Brown.

No. 839. Tobacco Experiment Station, Salisbury—Report of General Crop Experiments, by C. A. Kelsey Harvey, Manager.

No. 840. Curing Tobacco by the Leaf Method v. Curing on the Stalk, by W. Collingwood-Evans, B.Sc. (Agr.).

No. 846. Leaf Curl in Tobacco, by Dr. H. H. Storey.

No. 850. Pests of Stored Tobacco in Southern Rhodesia, by M. C. Mossop, M.Sc., Entomologist.

Handbook of Tobacco Diseases in Southern Rhodesia, by J. C. F. Hopkins, B.Sc., A.I.C.T.A. Price 3/6 post free from Accountant, Department of Agriculture, Salisbury.

LIVE STOCK.

No. 338. From Breeder to Butcher; Beef Experiment No 5, by E. A. Nobbs, Ph.D., B.Sc.

No. 381. From Breeder to Butcher; Cattle Feeding Experiment No. 8, by Eric A. Nobbs, Ph.D., B.Sc.

No. 421. From Breeder to Butcher; Cattle Feeding Experiment No. 9, Government Experiment Farm, Gwebi, by E. A. Nobbs, Ph.D., B.Sc., F.H.A.S.

No. 446. From Breeder to Butcher; Cattle Feeding Experiment No. 11, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc., F.H.A.S.

No. 468. From Breeder to Butcher; Cattle Feeding Experiment No. 13, by Eric A. Nobbs, Ph.D., B.Sc.

No. 483. From Breeder to Butcher; Cattle Feeding Experiments Nos. 14 and 15, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc.

No. 624. The Construction of Dipping Tanks for Cattle (Revised).

No. 701. Feeding Bullocks at Gwebi, by S. D. Timson, M.C., Dip.Agric.

No. 719. Hand-rearing of Calves (Revised), by T. Hamilton, M.A., N.D.A., N.D.D., Dairy Expert.

No. 720. Fattening for Beef at the Gwebi Farm, by H. G. Mundy, Chief Agriculturist, and T. J. Needham, Accountant, Agricultural and Veterinary Departments.

No. 737. Fur and Wool-producing Rabbits, by Captain Edgar S. Everett, Hovere Farm, Banket.

No. 749. Dehorn your Commercial Cattle, by W. Fleming, Stock Adviser.

No. 755. Iodine in Animal Nutrition, by J. Park Hamilton, District Veterinary Surgeon, Gwelo.

No. 801. Sheep Farming in the Melsetter District, by J. C. Kruger, Part-time Sheep Adviser in the Melsetter District.

No. 845. The Raising of Bacon Pigs, by Dr. A. E. Romyn, Senior Animal Husbandry Officer; C. A. Murray, Lecturer in Animal Husbandry, Matopos School of Agriculture, and D. A. Lawrence, Veterinary Research Officer.

Arsenite Cattle Dip—How to Mix.

DAIRYING.

No. 520. *Treatment of Gassy Curds in Cheese-making*, by T. Hamilton, M.A., N.D.A., N.D.D.

No. 530. The Dairy Industry: Causes of Variation in Cream Tests, by T. Hamilton, M.A., N.D.A., N.D.D.

No. 577. Cream Cheese, by J. R. Corry, B.Sc. (Agr.).

No. 594. Milk Recording and its Advantages, by T. Hamilton, M.A., N.D.A., N.D.D. Introduction by J. R. Corry, B.Sc.

No. 667. Farm Cheese-making, by T. Hamilton, M.A., N.D.A., N.D.D.; Dairy Expert.

No. 703. Dairy Buildings in Southern Rhodesia: Cow Byre—Type II., by B. G. Gundry, Irrigation Branch.

No. 711. Dairy Buildings in Southern Rhodesia. A Small Farm Dairy, by B. G. Gundry, A.I.Mech.E.

No. 717. Gouda or Sweet Milk Cheese-making, by T. Hamilton, M.A., N.D.A., N.D.D., Dairy Expert.

No. 730. Common Defects in Butter-making, by T. Hamilton, M.A., N.D.A., N.D.D., and J. R. Corry, B.Sc. (Agr.), Dairy Experts.

No. 785. Bacon Curing on the Farm, by T. Hamilton, M.A., N.D.A., N.D.D., Dairy Expert.

No. 792. The Feeding of Dairy Stock in Southern Rhodesia, by T. Hamilton, M.A., N.D.A., N.D.D., and J. R. Corry, B.Sc. (Agr.), Dairy Experts.

No. 799. *The Objects of Ripening Cream for Butter-Making*, and a few Hints on Cream Production, by F. Lammas, Dairy Officer.

No. 818. Farm Butter-making—Issued by the Dairy Branch.

No. 844. Southern Rhodesia Milk Recording Scheme.

No. 862. Cream Cheese, by F. A. Lammas, Dairy Officer.

Points to be observed in Cream Production.

VETERINARY.

No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.

No. 536. Inoculation of Cattle against Redwater and Gall Sickness, by Ll. E. W. Bevan, M.R.C.V.S.

No. 570. The Spaying of Bovines, by G. C. Hooper Sharpe, M.C., M.R.C.V.S., and M. H. Kingcome, M.R.C.V.S.

No. 597. Suspected Poisoning of Stock: The Proper Procedure, by M. H. Kingcome, M.R.C.V.S. (Lond.), and A. W. Facer, B.A. (Oxon.), A.I.C.

No. 618. Notes from the Veterinary Laboratory: Quarter Evil, by Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research.

No. 642. The Laboratory Diagnosis of Animal Diseases, by Ll. E. W. Bevan, M.R.C.V.S.

No. 666. Notes from the Veterinary Laboratory: Præmonitus—Præmunitus, by Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research.

No. 678. Cattle Transport Areas.

No. 739. The Laboratory Diagnosis of Animal Diseases: A Note to Emphasise some Points in the Preparation and Forwarding of Specimens, by D. A. Lawrence, B.V.Sc., Veterinary Research Officer.

No. 756. Parasitic Gastritis of Cattle, by Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research.

No. 760. A Note on Sheep Diseases in Southern Rhodesia, by D. A. Lawrence, B.V.Sc., Veterinary Research Officer, Department of Agriculture, Salisbury.

No. 772. Notes from the Veterinary Laboratory: Ophthalmia, by Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research.

No. 819. Measles in Swine, by P. D. Huston, M.R.C.V.S.

Services of Government Veterinary Surgeons.

The Campaign against African Coast Fever, by Ll. E. W. Bevan, M.R.C.V.S.

Parasitic Gastritis of Cattle, by Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research.

IRRIGATION.

No. 384. The Application of Water in Irrigation, by A. C. Jennings, Assoc.M.Inst.C.E., A.M.I.E.E.

No. 412. Water Power Resources of Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 529. The Umtali River Irrigation Scheme, by C. P. Robinson, B.Sc.

No. 632. Domestic Water Supplies and Sanitation on the Farm, by P. H. Haviland, B.Sc. (Eng.).

No. 633. The Cost of Pumping for Irrigation, by R. H. Roberts, B.Sc. (Eng.).

No. 640. Levelling for Irrigation, by Dr. W. S. H. Cleghorne, M.I.Mech.E.

No. 659. The Hydraulic Ram, revised by P. H. Haviland, B.Sc.

No. 660. Small Earthen Storage Reservoirs, by C. L. Robertson, B.Sc.

No. 668. The Water Act, 1927, by C. L. Robertson, B.Sc. (Eng.), A.M.I.C.E.

No. 670. Irrigation Canals, by P. H. Haviland, B.Sc. (Eng.).

No. 735. Soil Erosion, by P. H. Haviland, B.Sc. (Eng.), A.M.I.C.E., Assistant Irrigation Engineer.

No. 766. Conditions Governing the Hire of Government Boring Machines.

No. 780. Short Specifications for Reinforced Brick Tanks up to 20,000 Gallons Capacity, by R. Hamilton Roberts, B.Sc. (Eng.), Assistant Irrigation Engineer.

No. 782. Reinforced Concrete Water Tanks, by R. Hamilton Roberts, B.Sc. (Eng.).

No. 786. Low Concrete Dams, by R. Hamilton Roberts, B.Sc. (Eng.), Assistant Irrigation Engineer.

No. 808. The Application of Water in Irrigation, by R. Hamilton Roberts, B.Sc. (Eng.), Assistant Irrigation Engineer.

No. 811. Irrigation Canal Structures, by R. H. Roberts, B.Sc.(Eng.), Assistant Irrigation Engineer.

No. 860. Soil Drainage and Utilisation of Vleis, by R. H. Roberts, B.Sc. (Eng.), Assistant Irrigation Engineer.

FORESTRY.

No. 555. Forestry in the Melsetter District, by J. S. Henkel.

No. 575. Tending of Eucalyptus Plantations, by A. S. Thornewill, B.A.

No. 722. Rules for Tree-planting, by T. L. Wilkinson, M.Sc., B.Sc.F.

No. 744. Farm Forest Practice in Southern Rhodesia; Part IV. Tending and Care of Young Plantations. Issued by the Forest Service.

No. 763. The Utilisation of Wood, by T. L. Wilkinson, M.Sc., B.Sc.F.

No. 769. The Utilisation of Wood, by T. L. Wilkinson, M.Sc., B.Sc.F.

No. 778. The Utilisation of Wood in Southern Rhodesia—Conversion and Disposal of Timber, by T. L. Wilkinson, M.Sc., B.Sc.F., District Forest Officer.

No. 791. The Utilisation of Wood in Southern Rhodesia: Fencing, by T. L. Wilkinson, M.Sc., B.Sc.F., District Forest Officer.

No. 809. Establishing Pines: Preliminary Observations on the Effects of Soil Inoculation. Issued by the Division of Forestry.

No. 817. The Raising of Forest Seedlings and Transplants on the Farm, by E. J. Kelly Edwards, M.A., Dip.For. (Oxon.), Acting Chief Forest Officer.

No. 857. Charcoal Burning on the Farm, by R. J. Allen, Forester, Rhodes Matopo School of Agriculture and Experiment Station.

Price List of Forest Tree Transplants, Ornamental Trees and Shrubs, Hedge Plants, Creepers and Seeds.

HORTICULTURE.

No. 471. Budding of Citrus Trees, by A. G. Turner.

No. 637. Harvesting, Packing and Marketing of Deciduous and Tropical Fruits, by G. W. Marshall, Horticulturist.

No. 669. Citrus Fruit Growing in Rhodesia, by G. W. Marshall, Horticulturist.

No. 725. Investigations into "Collar-Rot" Disease of Citrus, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A. (Trinidad).

No. 741. Fruit Growing in Southern Rhodesia: The Home Orchard, by G. W. Marshall, Horticulturist.

No. 805. Making a Garden in Rhodesia: Hints for Beginners and Newcomers, by Mrs. E. M. V. Carnegie.

No. 814. Avocado Growing in South Africa, by Redvers J. Blatt, B.Sc., Ph.D.

No. 821. Vegetable Growing in Southern Rhodesia—Lettuce, by G. W. Marshall, Horticulturist.

No. 824. Vegetable Growing in Southern Rhodesia—Tomato Culture, by G. W. Marshall, Horticulturist.

No. 829. Asparagus Culture, by G. W. Marshall, Horticulturist.

No. 834. Celery Culture, by G. W. Marshall.

No. 843. Vegetable Growing in Southern Rhodesia: Onion Culture, by G. W. Marshall, Horticulturist.

A Comparative Study of the Citrus Industry of South Africa, by Herbert J. Webber, Ph.D., D.Agr. Price 2s.

ENTOMOLOGY AND PLANT PATHOLOGY.

No. 139. Termites, or "White Ants," by Rupert W. Jack, F.E.S.

No. 178. Illustrations of Natural Forest in relation to Tsetse Fly, by R. W. Jack, F.E.S.

No. 197. Chafer Beetles, by R. W. Jack, F.E.S.

No. 204. Some Injurious Caterpillars, by R. W. Jack, F.E.S.

No. 214. Some Household Insects, by R. Lowe Thompson, B.A.

No. 219. More Household Insects, by R. Lowe Thompson, B.A.

No. 228. Rhodesian Citrus Pests, by R. W. Jack, F.E.S.

No. 233. Does it Pay to Spray Potatoes in Southern Rhodesia? by Rupert W. Jack, F.E.S.

No. 261. Turnip Sawfly, by R. W. Jack, F.E.S.

No. 369. The Bean Stem Weevil, a Minor Pest of Beans, by Rupert W Jack. F.E.S.

No. 385. The Common Fruit Beetle, by R. W. Jack, F.E.S.

No. 425. Notes from the Entomological Branch, by Rupert W. Jack, F.E.S., Chief Entomologist.

No. 450. Insect Pests of Fruits other than Citrus in Southern Rhodesia, by R. W. Jack, F.E.S.

No. 476. Tsetse Fly—Inspection of Shangani Experimental Area, by Rupert W. Jack, F.E.S.

No. 503. Locusts, by J. K. Chorley.

No. 516. The Coming Campaign against Locusts, by Rupert W. Jack, F.E.S.

No. 522. Notes on the Black Citrus Aphis, by C. B. Symes.

No. 548. Insect Pests of Cotton, by C. B. Symes.

No. 553. Observations on Some Injurious Markings of Oranges, by C. B. Symes.

No. 587. Tsetse Fly in the Lomagundi District, by R. W. Jack, F.E.S.

No. 593. Notes from the Entomological Laboratory—(1) Outbreak of Army Worm (Laphygma exempta, Wlk.), (2) Cattle Myiasis: "Screw Worm," by Rupert W. Jack, F.E.S.

No. 602. Preliminary List of Plant Diseases Recorded in Southern Rhodesia, by F. Eyles.

No. 613. Two Diseases of the Vine, by F. Eyles, Mycologist.

No. 639. Diseased Plants for Examination: Collecting and Despatching the Material, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A. (Trinidad).

No. 653. The Care of Tobacco Seed Beds, by J. C. F. Hopkins, B.Sc., (Lond.), A.I.C.T.A. (Trinidad).

No. 654. Root Gallworm or Root Knot Eelworm (Heterodera radicicola, Greef), by Rupert W. Jack, F.E.S.

No. 665. Tobacco Pests of Rhodesia, by Rupert W. Jack, F.E.S., Chief Entomologist.

No. 671. Wildfire and Angular Spot of Tobacco, by J. C. F. Hopkins, B.Sc., A.I.C.T.A.

No. 673. Bats, by J. Isgaer Roberts, B.Sc.

No. 696. Ticks Infesting Domestic Animals in Southern Rhodesia, by Rupert W. Jack, F.E.S., Chief Entomologist.

No. 714. Trap Cropping against Maize Pests, by Rupert W. Jack, F.E.S., Chief Entomologist.

No. 718. Preliminary Experiments on the Control of White Mould of Tobacco, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Chief Botanist and Mycologist.

No. 732. Two Common Diseases of Potato Tubers in Rhodesia, by J. C. F. Hopkins, B.Sc. (London), A.I.C.T.A.
No. 742. What is Diplodia in Maize? An Answer to a Popular Question To-day, by J. C. F. Hopkins, B.Sc. (London), A.I.C.T.A., Chief Botanist and Mycologist.
No. 747. Mycological Notes: (1) Seed Treatment for Maize against Diplodia; (2) Seed Treatment for Tobacco against Bacterial Diseases. Issued by authority of the Minister of Agriculture and Lands.
No. 748. Frog Eye Disease of Tobacco, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Chief Botanist and Mycologist.
No. 753. Leaf Spotting of Tobacco caused by Mosaic, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Chief Botanist and Mycologist.
No. 754. "Pinking" of Maize—Report of a Preliminary Investigation, by T. K. Sansom, B.Sc., Plant Breeder.
No. 784. Field Control of Frenching in Tobacco, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Plant Pathologist.
No. 788. A List of Plant Diseases Occurring in Southern Rhodesia, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Plant Pathologist.
A List of Plant Diseases Occurring in Southern Rhodesia, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Plant Pathologist. Snpplement No. 1.
No. 790. Notes on the Control of Some of the More Important Insect Pests of Citrus in Southern Rhodesia, by W. J. Hall, Ph.D., B.Sc., Entomologist to the British South Africa Company in Southern Rhodesia.
No. 796. The Army Worm (Laphygma Exempta, Wlk.), by Rupert W. Jack, Chief Entomologist.
No. 798. The Preparation of Bordeaux Mixture and Seasonal Notes on Tobacco Diseases, by J. C. F. Hopkins, B.Sc. (London), A.I.C.T.A.
No. 804. Locusts in Southern Rhodesia, by Rupert W. Jack, Chief Entomologist.
No. 825. Some Common Diseases of Potatoes in Southern Rhodesia, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A., Government Plant Pathologist.
No. 847. The Lesser Tobacco Wireworms, by Rupert W. Jack, Chief Entomologist.
No. 848. Mycological Notes: Seasonal Notes on Tobacco Diseases—3, Frog Eye; 4, White Mould; by J. C. F. Hopkins, B.Sc., London.
No. 856. A List of Plant Diseases occurring in Southern Rhodesia, Supplement 2, by J. C. F Hopkins, B.Sc. (Lond.), Government Plant Pathologist.
No. 861. Further Notes on Leaf Curl of Tobacco in Southern Rhodesia, by J. C. F. Hopkins, B.Sc. (Lond.), Plant Pathologist.

POULTRY

No. 622. Ducks on the Farm, by H. G. Wheeldon.
No. 635. Ovarian Troubles, by A. Little.
No. 638. Poultry Parasites, by A. Little.
No. 662. Poultry Husbandry: Temperament, by A. Little, Poultry Expert.
No. 721. Poultry Keeping in Rhodesia: Padigree Breeding, by H. G. Wheeldon, Assistant Poultry Expert.
No. 731. Scarcity of Eggs: Causes and Remedies, by A. Little, Poultry Expert.
No. 738. Hints to Breeders—Rearing Young Stock, by A. Little, Poultry Expert.
No. 740. Artificial Incubation, Brooding and Rearing of Chickens, by H. G. Wheeldon, Poultry Expert.
No. 761. Housing and Feeding of Adult Stock, by H. G. Wheeldon, Poultry Expert.

No. 795. The Turkey, by G. H. Cooper, Assistant Poultry Officer.

No. 803. Geese, by G. H. Cooper, Assistant Poultry Officer.

No. 827. The Ideal Brooder, by F. Roberts, Assistant Poultry Officer.

The following pamphlets can be obtained from the Poultry Expert upon application :—

- Selecting Birds for Laying Tests, by A. Little, Poultry Expert.
- Cold Weather: Treatment of Fowls in, by A. Little, Poultry Expert.
- Tuberculosis, by A. Little, Poultry Expert.
- Diseases of the Liver, by A. Little, Poultry Expert.
- Prevention of Disease among Poultry, by A. Little, Poultry Expert.
- Vices: Causes, Prevention and Cure, by A. Little, Poultry Expert.
- Chicken-pox (Warts), by A. Little, Poultry Expert.
- Autopsies, by A. Little, Poultry Expert.
- Autopsies (continued), by A. Little, Poultry Expert.
- Preparing Birds for Show, by A. Little, Poultry Expert.
- Coccidiosis, or Entero-Hepatitis, by A. Little, Poultry Expert.
- The Fowl Tick (Argas persicus), by A. Little, Poultry Expert.
- Worms (Autopsies—continued), by A. Little, Poultry Expert.
- Culling : A Seasonal Operation, by A. Little, Poultry Expert.
- Choosing a Male Bird, by A. Little, Poultry Expert.
- The Breeding Stock, by A. Little, Poultry Expert.
- Diseases of the Digestive System, by A. Little, Poultry Expert.
- Bone and Breast Bone, by A. Little, Poultry Expert.
- Mating for Improvement and Increased Egg Production, by A. Little, Poultry Expert.
- Partial Moult : Broodiness : Selection of Layers of Large Eggs, by A. Little, Poultry Expert.
- Sunflower as a Food, by A. Little, Poultry Expert.
- Grow Sunflowers, by A. Little, Poultry Expert.
- Exhibiting Eggs at Shows, by A. Little, Poultry Expert.
- Condition of Birds on Show, by A. Little, Poultry Expert.
- Green Food : The Result of not Supplying Sufficient to Poultry, by A. Little, Poultry Expert.
- Good and Bad Hatching Eggs, by A. Little, Poultry Expert.
- Grading Fowls, by A. Little, Poultry Expert.
- Heart Trouble, by A. Little, Poultry Expert.
- What are You Feeding for? by A. Little, Poultry Expert.
- Housing : Three Important Essentials, by A. Little, Poultry Expert.
- Menu at the Egg-Laying Test.
- Advice to Prospective Poultry Farmers, by A. Little, Poultry Expert.
- Seasonal Hints—August, by A. Little, Poultry Expert.
- Successful Chick Rearing, by H. G. Wheeldon, Assistant Poultry Expert.
- Hints to Breeders, October, by A. Little, Poultry Expert.
- Abnormalities in Eggs, by A. Little, Poultry Expert.
- Diseases of the Reproductive System, by A. Little, Poultry Expert.
- Notes for November, by A. Little, Poultry Expert.
- Hints to Breeders. Prepare for the Breeding Season, by A. Little.
- Respiratory Diseases, by A. Little, Poultry Expert.
- Selection and Preparation of Fowls for Exhibition, by H. G. Wheeldon, Poultry Expert.
- The Close of the Hatching Season and After, by H. G. Wheeldon, Poultry Expert.

METEOROLOGICAL.

No. 360. Notes on the Rainfall Season 1919-20 in Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 436. The Possibility of Seasonal Forecasting and Prospects for Rainfall Season 1922-23, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 524. The Use of an Aneroid Barometer, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 532. The Short Period Forecast and Daily Weather Report, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 542. Review of the Abnormal Rainfall Season 1924-25, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 712. The Time, and How to Find it, by N. P. Sellick, M.C., B.Sc. (Eng.).

No. 832. The Weather Map and the Short Period Weather Forecast, issued by the Meteorological Office.

MISCELLANEOUS.

No. 248. A Preservative for Samples of Arsenical Dips for Analysis, by A. G. Holborow, F.I.C.

No. 479. Quinine Prophylaxis in Malaria, by A. M. Fleming, M.B., C.M., F.R.C.S.E., D.P.H.

No. 518. Locusts as Food for Stock, by Rupert W. Jack, F.E.S.

No. 554. Pisé-de-Terre, by P. B. Aird.

No. 574. Brick-making on the Farm, by A. C. Jennings, Assoc.M.Inst.C.E., A.M.I.E.E.

No. 588. Concrete on the Farm, by N. P. Sellick, M.C., B.Sc. (Eng.), Assistant Irrigation Engineer.

No. 677. Road Motor Services.

No. 680. Preparation of Cotton for Sale, by H. C. Jefferys.

No. 686. The Land Bank, Its Functions and How it Operates, by S. Thornton.

No. 687. The Use of Explosives on the Farm, by P. H. Haviland, B.Sc. (Eng.).

No. 702. Book-Keeping on the Farm, by T. J. Needham, Acting Accountant, Agricultural and Veterinary Departments.

No. 707. Wood-Charcoal in Southern Rhodesia, by T. L. Wilkinson, B.Sc., Assistant Forest Officer.

No. 733. Jam-making, by Miss D. Bosman, Home Economics Officer, Division of Agricultural Education and Extension, in "Farming in South Africa."

No. 849. The Preservation of Farm Beacons, by L. M. McBean, Acting Surveyor General.

No. 852. Mixing of Fertilisers: A Guide to Methods of Calculation, by the Division of Chemistry.

No. 858. The Softening of Waters, by the Division of Chemistry.

How to Make Use of the Fencing Law.

Twelve Simple Rules for the Avoidance of Malaria and Blackwater.

Summary of the Game Laws of Southern Rhodesia